

CWV+ 2020 parameters
Jason Blackmore



Parameter Interpretations

Parameter	Interpretations
Effective Temperature/AT Weight (ET calculation)	Determines the combination of AT/ET used in the SNET calculation and how much of yesterday ET is used for today's ET
Effective Temperature Weight (I1)	What proportion of <u>SNET</u> is included in SNET Term (≈ 0.3)
Wind Chill Weight (I2)	In combination with W0 & T0 calculates WCT – gives a colder CWV where AT is less than T0
Cold Weather Sensitivity (I3)	CWV Cold: Determines when cold weather upturn is applied.
Cold Weather Upturn Threshold (V0)	
Lower Warm Weather Cut-Off (V1)	CWV Transition : Attempts to model a lower demand response as temperature increase. These in combination determines Max CWV
Upper Warm Weather Cut-Off (V2)	
Slope Relating to Warm Weather Cut-Off (q)	
Wind Chill Wind Cut-Off (W0)	determines at what speed wind (DWS) produces a wind chill effect
Wind Chill Temperature Cut-Off (T0)	values of temperature (AT) when wind chill is applied
Solar Radiance Effect (S0)	Solar effect on demand

2020 CWV+ Parameters

Parameter	EA	EM	NE	NO	NT	NW	SC	SE	SO	SW	WM	WN	WS
Effective Temperature/AT Weight	0.4599	0.4796	0.4592	0.4918	0.4731	0.4983	0.5049	0.4843	0.4381	0.4482	0.4709	0.4822	0.5431
Effective Temperature Weight (I1)	0.723	0.689	0.672	0.646	0.715	0.646	0.680	0.772	0.692	0.623	0.692	0.618	0.657
Wind Chill Weight (I2)	0.015	0.010	0.009	0.008	0.015	0.009	0.011	0.006	0.015	0.008	0.010	0.009	0.008
Cold Weather Sensitivity (I3)	0.109	0.138	0.083	0.126	0.066	0.315	0.000	0.266	0.405	0.258	0.163	0.324	0.079
Cold Weather Upturn Threshold (V0)	-0.235	-1.344	-1.261	5.000	4.898	2.694	1.053	1.335	0.141	3.476	4.385	3.773	1.797
Lower Warm Weather Cut-Off (V1)	15.131	13.008	12.924	12.005	15.029	12.775	12.590	13.996	14.745	13.254	13.392	13.477	13.826
Upper Warm Weather Cut-Off (V2)	18.885	16.897	16.679	15.779	19.184	16.466	16.402	18.523	18.715	17.898	17.480	16.987	17.186
Slope Relating to Warm Weather Cut-Off (q)	0.368	0.424	0.446	0.438	0.429	0.513	0.509	0.375	0.345	0.337	0.368	0.445	0.384
Wind Chill Wind Cut-Off (W0)	-0.477	-2.417	-1.652	-0.894	-3.811	-5.000	-2.992	-0.721	-2.076	0.705	-3.619	-3.926	-1.910
Wind Chill Temperature Cut-Off (T0)	12.650	17.377	21.596	16.657	12.833	21.312	15.476	21.613	11.978	21.707	17.569	18.249	17.068
Solar Radiance Effect (S0)	0.635	0.698	0.568	0.950	0.695	0.802	0.507	0.566	0.559	0.801	0.678	0.679	0.776

LDZ/Weather Stations

LDZ	Temperature Weather Station	Wind Weather Station	Solar Weather Station
EA	Heathrow	Heathrow	Heathrow
EM	Watnall (Nottingham)	Watnall (Nottingham)	Watnall (Nottingham)
NE	Watnall (Nottingham)	Watnall (Nottingham)	Watnall (Nottingham)
NO	Albemarle	Albemarle	Durham
NT	Heathrow	Heathrow	Heathrow
NW	Manchester Rostherne	Manchester Rostherne	Manchester Rostherne
SC	Glasgow Bishopton	Glasgow Bishopton	Glasgow Bishopton
SE	Heathrow	Heathrow	Heathrow
SO	Southampton Ocean' Centre	Southampton Ocean' Centre	Southampton Ocean' Centre
SW	Yeovilton (from Filton)	Yeovilton (from Filton)	Yeovilton (from Filton)
WM	Winterbourne	Coleshill (Birmingham)	Coleshill (Birmingham)
WN	Manchester Rostherne	Manchester Rostherne	Manchester Rostherne
WS	St Athan	St Athan	St Athan

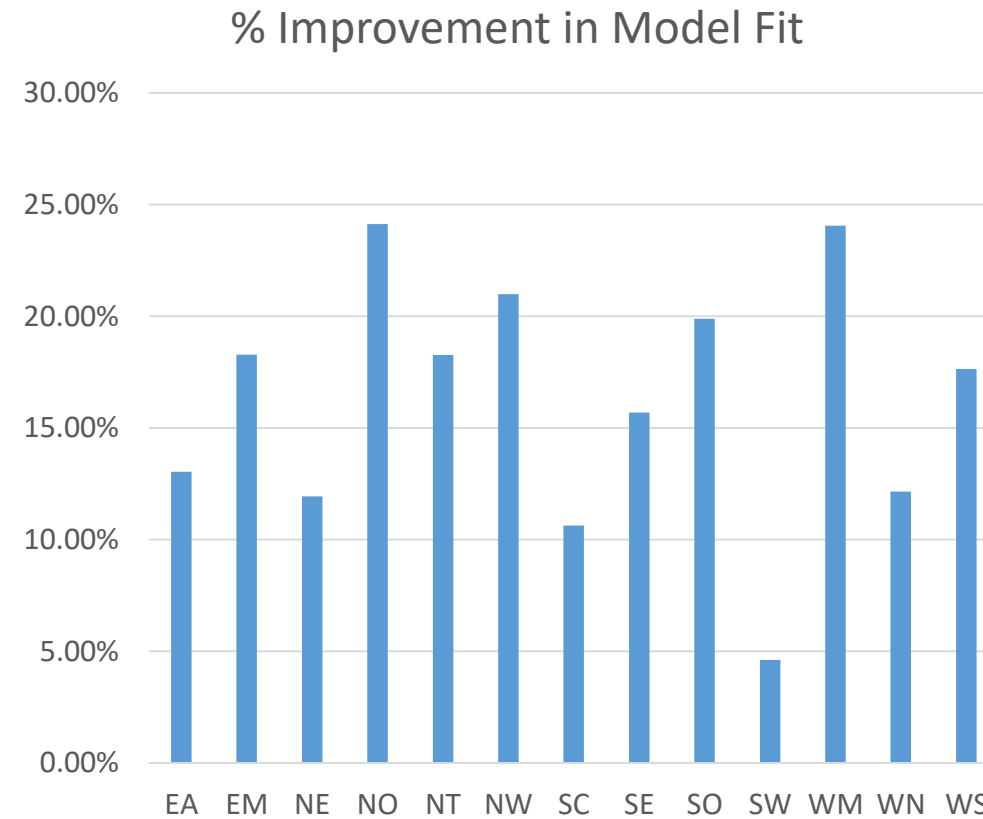
Weather data history was complete in most LDZs, requiring minimal cleaning/filling, except for:

WM – use of Coleshill temperatures for the period 01/10/2010-28/02/2011 due to missing Winterbourne station data

Additional Durham weather station used for LDZ NO solar data

R2

LDZ	2015	2020	Error explained
EA	0.9912	0.9923	13.04%
EM	0.9919	0.9934	18.29%
NE	0.9867	0.9883	11.94%
NO	0.9859	0.9893	24.13%
NT	0.9930	0.9943	18.27%
NW	0.9890	0.9913	20.99%
SC	0.9892	0.9903	10.64%
SE	0.9915	0.9929	15.69%
SO	0.9918	0.9934	19.89%
SW	0.9904	0.9908	4.61%
WM	0.9921	0.9940	24.06%
WN	0.9840	0.9859	12.15%
WS	0.9833	0.9862	17.64%



Detailed LDZ Results Follow

Results: LDZ EA

Parameter	2015	2020
Effective Temperature/AT Weight	0.5	0.4599
Effective Temperature Weight (I1)	0.719	0.723
Wind Chill Weight (I2)	0.014	0.015
Cold Weather Sensitivity (I3)	0.090	0.109
Cold Weather Upturn Threshold (V0)	3.000	-0.235
Lower Warm Weather Cut-Off (V1)	15.300	15.131
Upper Warm Weather Cut-Off (V2)	19.200	18.885
Slope Relating to Warm Weather Cut-Off (q)	0.340	0.368
Wind Chill Wind Cut-Off (W0)	0.000	-0.477
Wind Chill Temperature Cut-Off (T0)	14.000	12.650
Solar Radiance Effect (S0)	-	0.635
R2	0.9912	0.9923

2020 CWV+

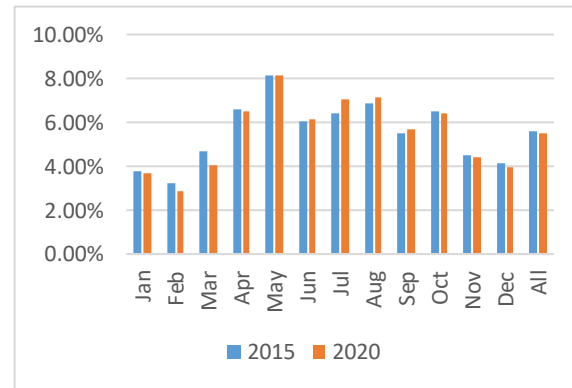
LDZ	Station
EA	Heathrow

Gas Years	2010/11 to 2017/18
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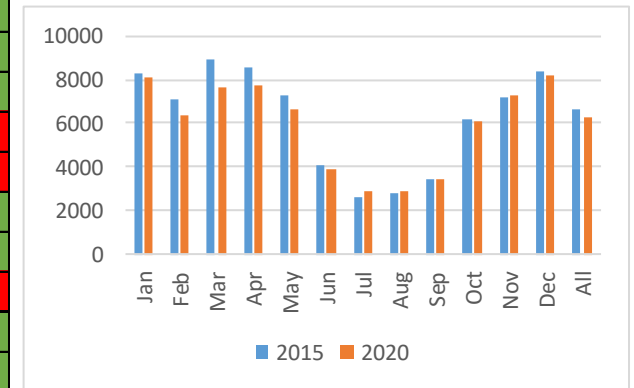
Parameters	Avg. Mean Abs. %Error
2015	5.55%
2020	5.52%

Avg. Adj. R-Sq.	Avg. RMSE (MWhs)	Avg. %diff. in est 1 in20 peak demand
0.9912	6636	
0.9923	6253	

MAPE							
Month	2015	2020	Season				
			Year	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
Jan	3.77%	3.66%	2015	3.74%	6.47%	6.42%	5.51%
Feb	3.24%	2.87%	2020	3.53%	6.21%	6.78%	5.50%
Mar	4.65%	4.05%					
Apr	6.63%	6.48%					
May	8.13%	8.11%					
Jun	6.01%	6.13%					
Jul	6.38%	7.06%					
Aug	6.86%	7.14%					
Sep	5.50%	5.66%					
Oct	6.49%	6.37%					
Nov	4.51%	4.45%					
Dec	4.17%	3.99%					
All	5.55%	5.52%					



RMSE							
Month	2015	2020	Season				
			Year	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
Jan	8286	8117	2015	8058	8263	3237	5805
Feb	7130	6375	2020	7704	7347	3254	5801
Mar	8887	7654					
Apr	8521	7739					
May	7305	6608					
Jun	4084	3919					
Jul	2626	2877					
Aug	2838	2878					
Sep	3431	3411					
Oct	6222	6057					
Nov	7146	7248					
Dec	8412	8207					
All	6636	6253					



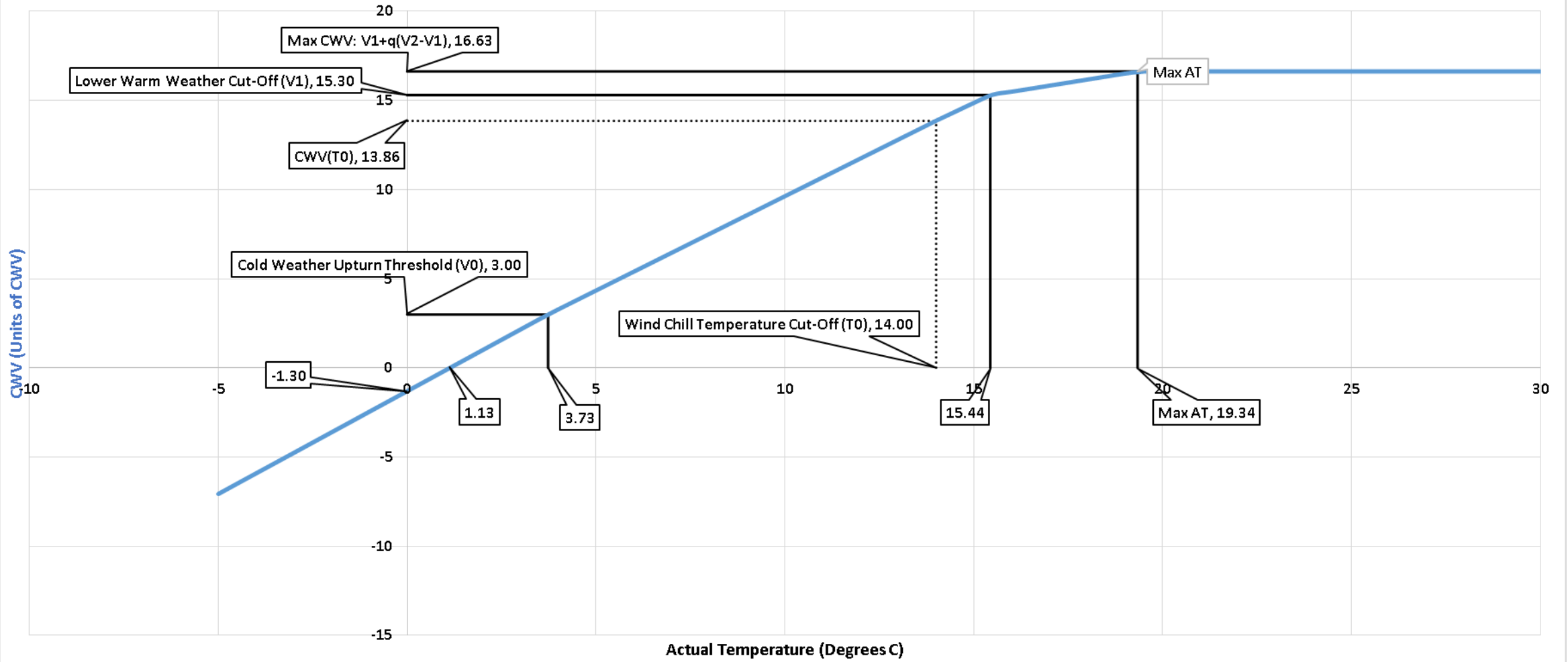
2020 CWV+ variance v CWV benchmark

MAPE Variance from 2015 Parameters: EA

	2010	2011	2012	2013	2014	2015	2016	2017	All Years
Jan	-0.03%	0.00%	-0.53%	-0.08%	-0.04%	0.03%	-0.17%	-0.04%	-0.11%
Feb	-0.31%	-0.41%	-0.27%	-0.63%	-0.16%	-0.25%	-0.62%	-0.31%	-0.37%
Mar	-1.22%	-0.72%	-0.66%	-0.55%	-0.36%	-0.40%	-0.51%	-0.39%	-0.60%
Apr	0.41%	0.53%	-0.25%	0.56%	0.66%	-0.86%	-0.80%	-1.44%	-0.15%
May	1.73%	-1.56%	-0.67%	1.10%	-0.24%	0.05%	-1.18%	0.58%	-0.02%
Jun	0.96%	-0.71%	0.35%	1.01%	0.18%	0.05%	-0.45%	-0.50%	0.11%
Jul	1.47%	0.03%	0.83%	0.36%	0.93%	-0.03%	0.25%	1.57%	0.67%
Aug	0.13%	-0.32%	0.48%	-0.40%	0.61%	0.88%	-0.37%	1.19%	0.28%
Sep	0.11%	0.47%	0.59%	0.35%	-0.33%	0.05%	-0.18%	0.28%	0.17%
Oct	-0.14%	-0.92%	0.25%	0.73%	0.07%	-0.57%	-0.15%	-0.18%	-0.12%
Nov	0.47%	-0.28%	-0.27%	-0.28%	-0.36%	0.73%	-0.03%	-0.50%	-0.07%
Dec	-0.32%	-0.42%	-0.55%	-0.18%	0.18%	0.22%	-0.24%	-0.14%	-0.18%
All Months	0.27%	-0.36%	-0.06%	0.17%	0.09%	-0.01%	-0.37%	0.01%	-0.03%

2015

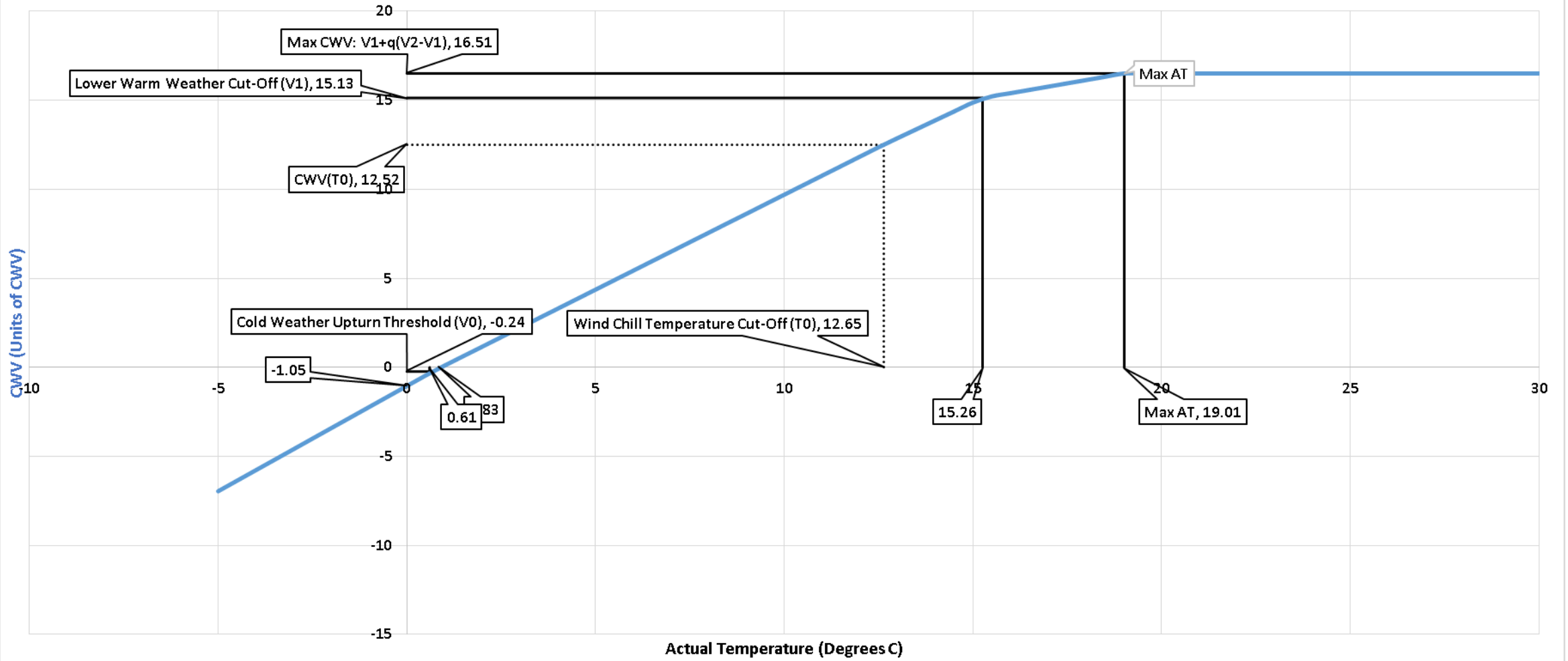
Fixed Wind Speed



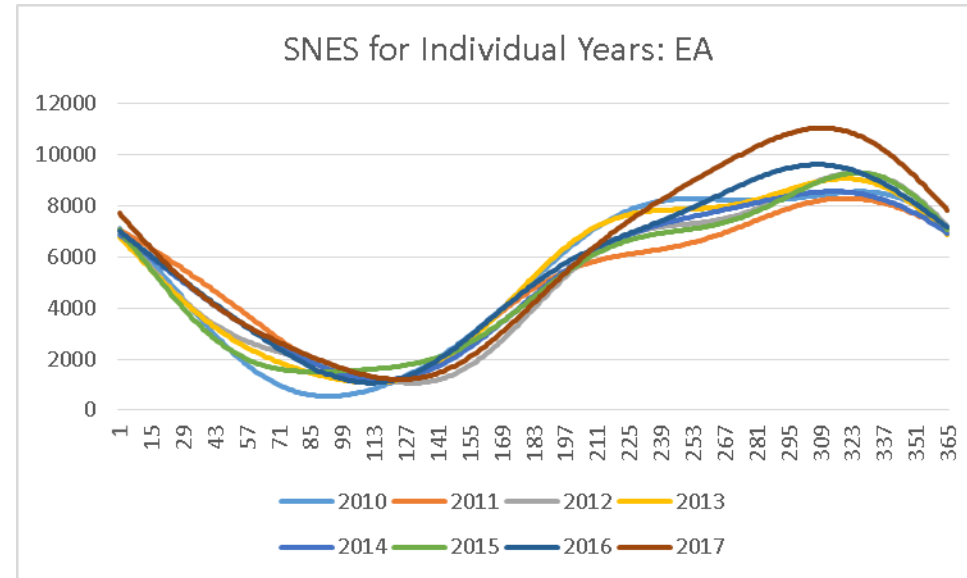
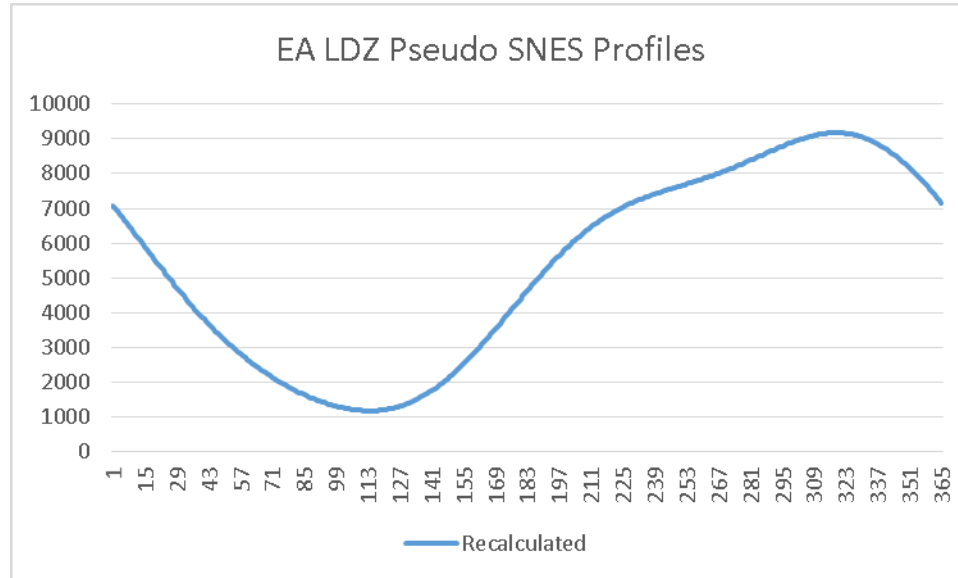
2020

Fixed Wind Speed

4.00



SNES



Results: LDZ EM

Parameter	2015	2020
Effective Temperature/AT Weight	0.5	0.4796
Effective Temperature Weight (I1)	0.691	0.689
Wind Chill Weight (I2)	0.014	0.010
Cold Weather Sensitivity (I3)	0.050	0.138
Cold Weather Upturn Threshold (V0)	3.000	-1.344
Lower Warm Weather Cut-Off (V1)	13.500	13.008
Upper Warm Weather Cut-Off (V2)	16.800	16.897
Slope Relating to Warm Weather Cut-Off (q)	0.490	0.424
Wind Chill Wind Cut-Off (W0)	0.000	-2.417
Wind Chill Temperature Cut-Off (T0)	14.000	17.377
Solar Radiance Effect (S0)		0.698
R2	0.9919	0.9934

2020 CWV+

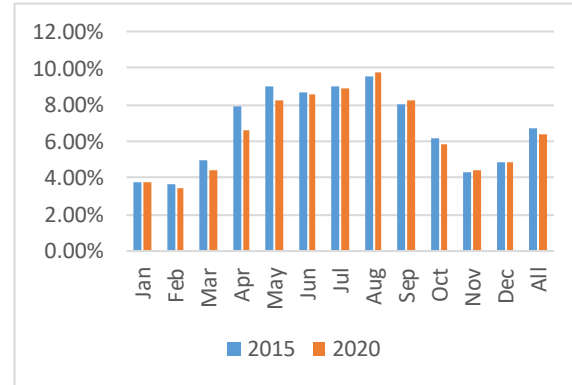
LDZ	Station
EM	Watnall (Nottingham)

Gas Years	2010/11 to 2017/18
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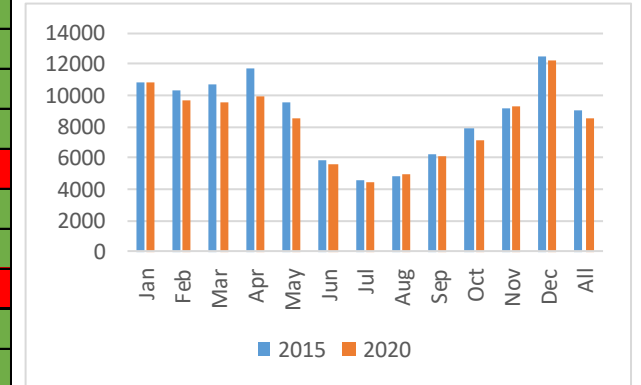
Parameters	Avg. Mean Abs. %Error
2015	6.67%
2020	6.43%

Avg. Adj. R-Sq.	Avg. RMSE (MWhs)	Avg. %diff. in est 1 in20 peak demand
0.9919	9060	
0.9934	8528	

MAPE							
Month	2015	2020	Season				
			Year	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
Jan	3.78%	3.70%	2015	4.09%	7.27%	9.10%	6.16%
Feb	3.61%	3.43%	2020	3.99%	6.40%	9.12%	6.15%
Mar	4.93%	4.38%					
Apr	7.91%	6.62%					
May	8.98%	8.19%					
Jun	8.66%	8.62%					
Jul	9.06%	8.93%					
Aug	9.57%	9.79%					
Sep	8.04%	8.22%					
Oct	6.11%	5.82%					
Nov	4.33%	4.42%					
Dec	4.83%	4.80%					
All	6.67%	6.43%					



RMSE							
Month	2015	2020	Season				
			Year	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
Jan	10835	10877	2015	11299	10694	5084	7664
Feb	10316	9612	2020	11038	9336	5021	7614
Mar	10744	9541					
Apr	11739	9945					
May	9518	8481					
Jun	5817	5632					
Jul	4541	4438					
Aug	4832	4943					
Sep	6284	6096					
Oct	7891	7120					
Nov	9143	9290					
Dec	12470	12281					
All	9060	8528					



2020 CWV+ variance v CWV benchmark

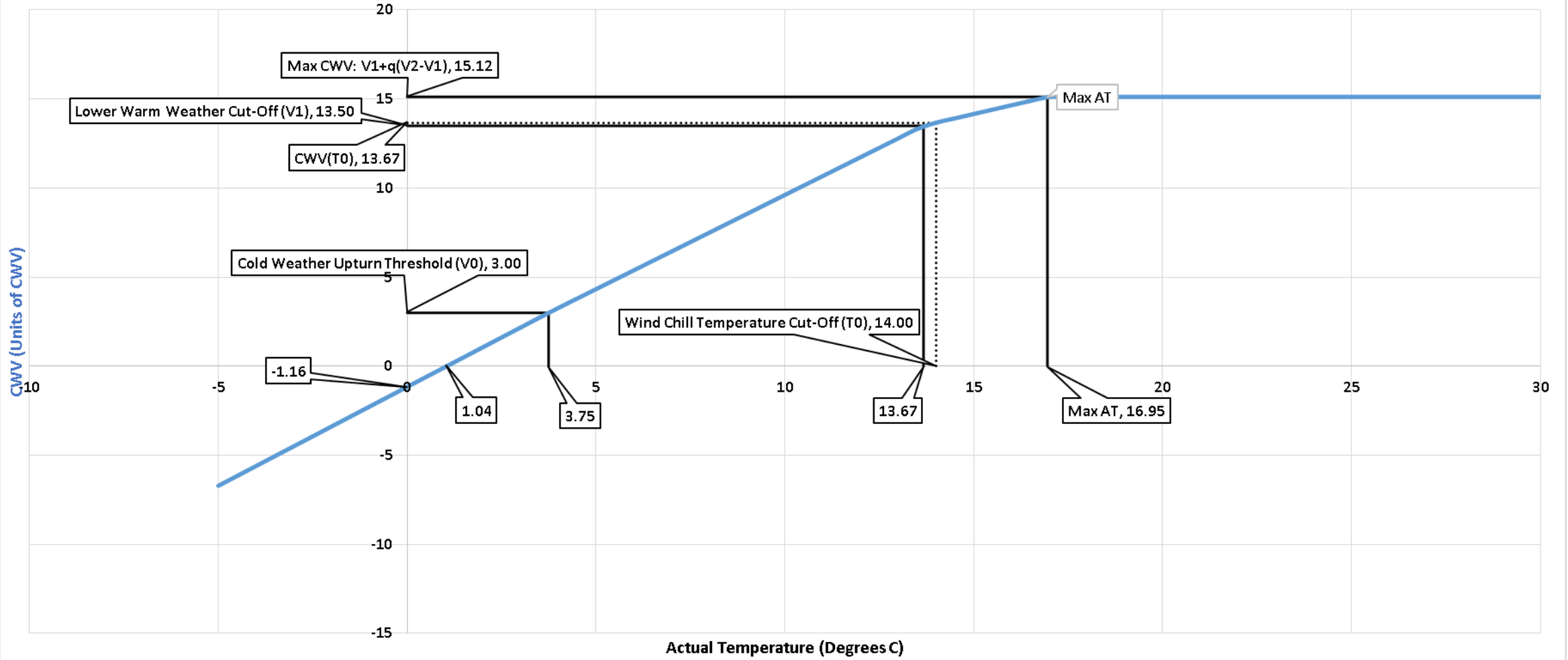
MAPE Variance from 2015 Parameters: EM

	2010	2011	2012	2013	2014	2015	2016	2017	All Years
Jan	-0.07%	0.01%	-0.42%	-0.03%	-0.02%	0.15%	-0.18%	-0.06%	-0.08%
Feb	-0.04%	-0.31%	-0.47%	-0.55%	-0.33%	0.37%	0.09%	-0.24%	-0.18%
Mar	-0.14%	-1.64%	0.03%	-0.97%	-0.04%	-0.78%	-0.76%	-0.07%	-0.55%
Apr	-2.02%	-0.92%	-0.08%	-1.21%	-2.77%	-0.76%	-2.14%	-0.36%	-1.28%
May	-0.90%	0.27%	-2.27%	-0.94%	0.10%	-0.46%	-0.39%	-1.72%	-0.79%
Jun	0.96%	-0.99%	0.09%	0.15%	0.37%	-1.11%	-0.31%	0.47%	-0.05%
Jul	0.67%	-0.24%	-0.57%	-0.15%	-0.72%	-0.23%	0.45%	-0.27%	-0.13%
Aug	-0.30%	0.53%	0.76%	0.55%	-1.22%	1.08%	0.06%	0.30%	0.22%
Sep	0.61%	-0.47%	0.20%	-0.53%	0.94%	0.29%	1.14%	-0.70%	0.18%
Oct	-0.22%	-0.88%	-0.47%	-0.22%	0.31%	-1.32%	0.00%	0.49%	-0.29%
Nov	0.26%	0.20%	0.03%	-0.07%	0.77%	-0.22%	-0.36%	0.17%	0.10%
Dec	-0.13%	-0.33%	0.43%	-0.13%	-0.02%	0.28%	-0.44%	0.06%	-0.03%
All Months	-0.11%	-0.40%	-0.23%	-0.34%	-0.22%	-0.23%	-0.24%	-0.16%	-0.24%

2015

Fixed Wind Speed

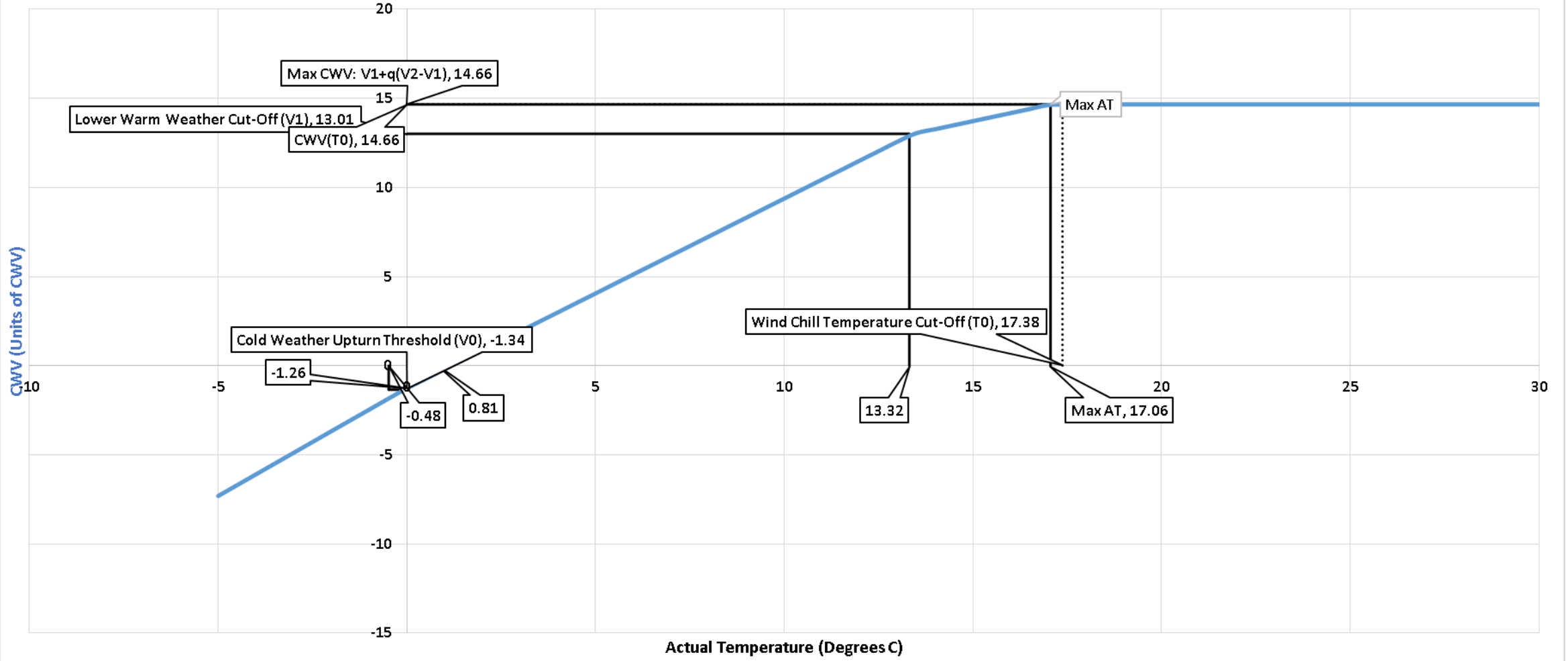
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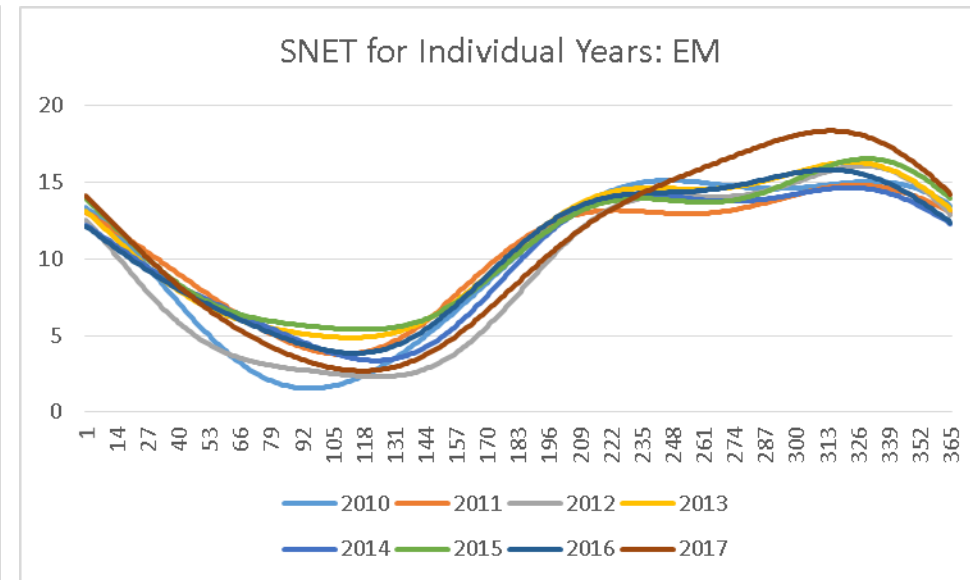
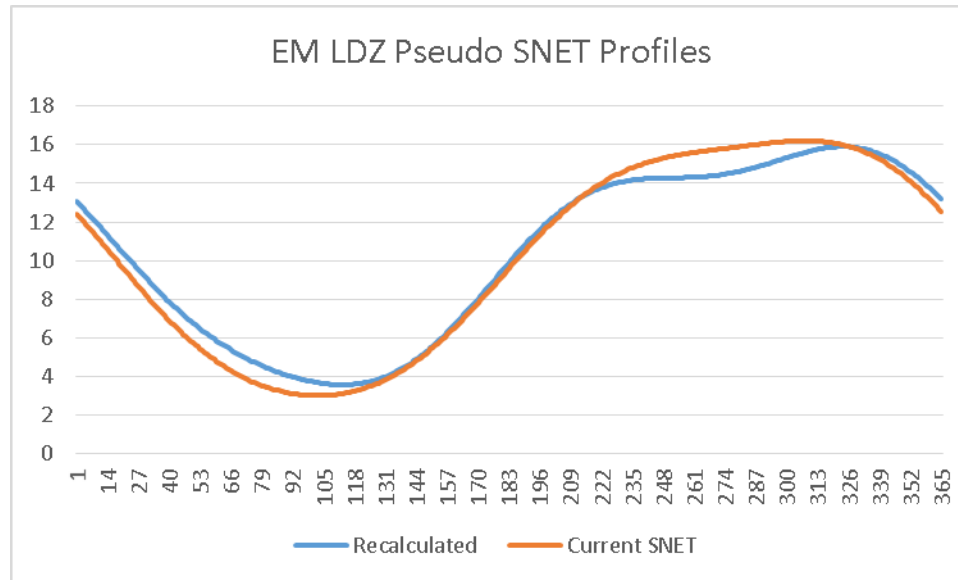
2020

Fixed Wind Speed

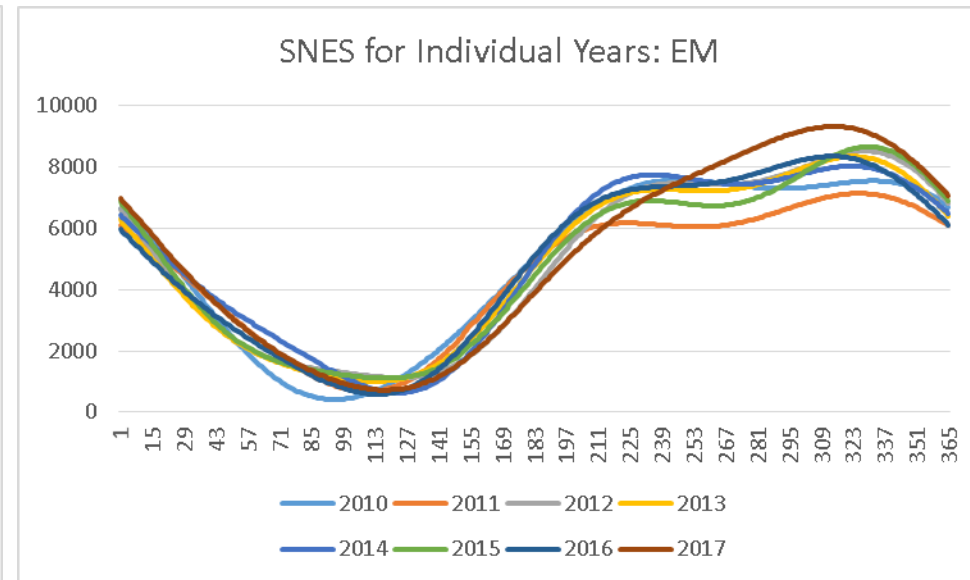
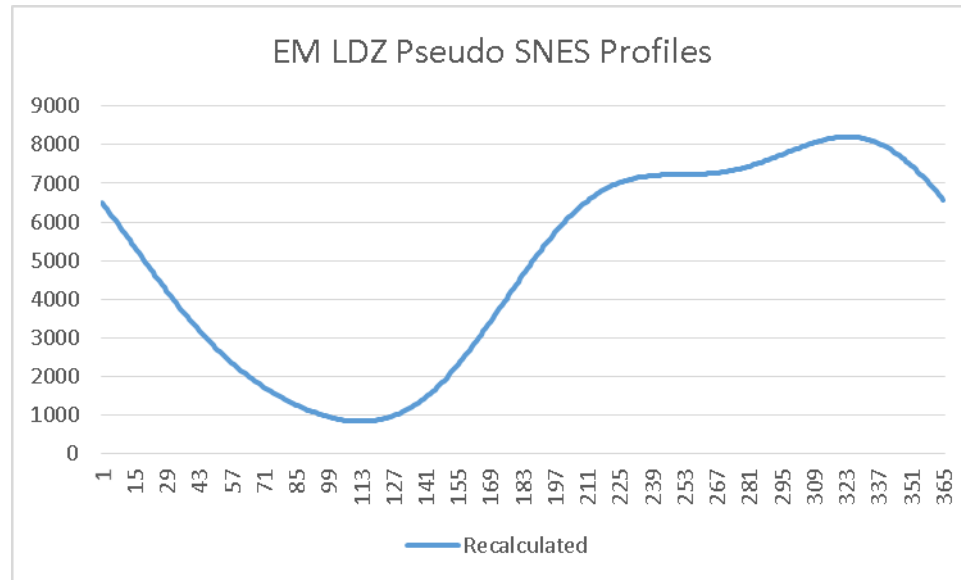
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SNET



SNES



Results: LDZ NE

Parameter	2015	2020
Effective Temperature/AT Weight	0.5	0.4592
Effective Temperature Weight (I1)	0.676	0.672
Wind Chill Weight (I2)	0.016	0.009
Cold Weather Sensitivity (I3)	0.000	0.083
Cold Weather Upturn Threshold (V0)	0.000	-1.261
Lower Warm Weather Cut-Off (V1)	14.700	12.924
Upper Warm Weather Cut-Off (V2)	17.900	16.679
Slope Relating to Warm Weather Cut-Off (q)	0.380	0.446
Wind Chill Wind Cut-Off (W0)	0.000	-1.652
Wind Chill Temperature Cut-Off (T0)	14.000	21.596
Solar Radiance Effect (S0)		0.568
R2	0.9867	0.9883

2020 CWV+

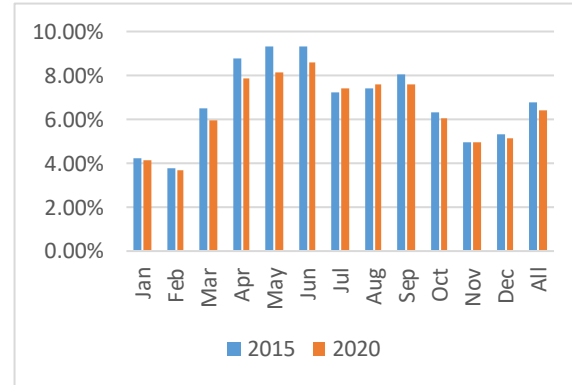
LDZ	Station
NE	Watnall (Nottingham)

Gas Years	2010/11 to 2017/18
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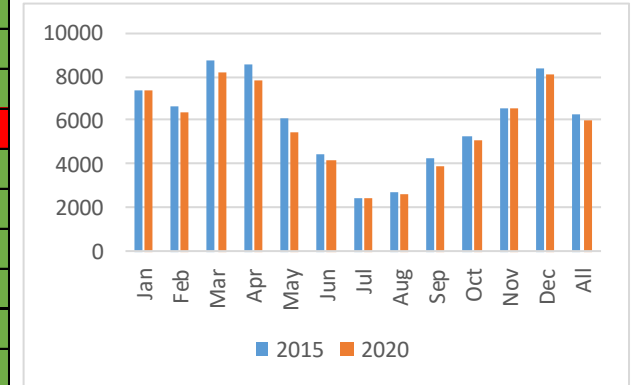
Parameters	Avg. Mean Abs. %Error
2015	6.78%
2020	6.43%

Avg. Adj. R-Sq.	Avg. RMSE (MWhs)	Avg. %diff. in est 1 in20 peak demand
0.9867	6301	
0.9883	5989	

MAPE							
Month	2015	2020	Season				
			Year	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
Jan	4.22%	4.16%	2015	4.46%	8.18%	7.96%	6.45%
Feb	3.81%	3.64%	2020	4.32%	7.30%	7.87%	6.20%
Mar	6.46%	5.93%					
Apr	8.74%	7.85%					
May	9.35%	8.14%					
Jun	9.31%	8.59%					
Jul	7.20%	7.42%					
Aug	7.43%	7.62%					
Sep	8.04%	7.58%					
Oct	6.34%	6.04%					
Nov	4.98%	4.99%					
Dec	5.29%	5.09%					
All	6.78%	6.43%					



RMSE							
Month	2015	2020	Season				
			Year	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
Jan	7351	7393	2015	7547	7863	3316	5344
Feb	6654	6405	2020	7388	7219	3135	5261
Mar	8717	8150					
Apr	8548	7788					
May	6064	5434					
Jun	4480	4127					
Jul	2413	2461					
Aug	2719	2574					
Sep	4219	3891					
Oct	5289	5063					
Nov	6580	6506					
Dec	8379	8100					
All	6301	5989					



2020 CWV+ variance v CWV benchmark

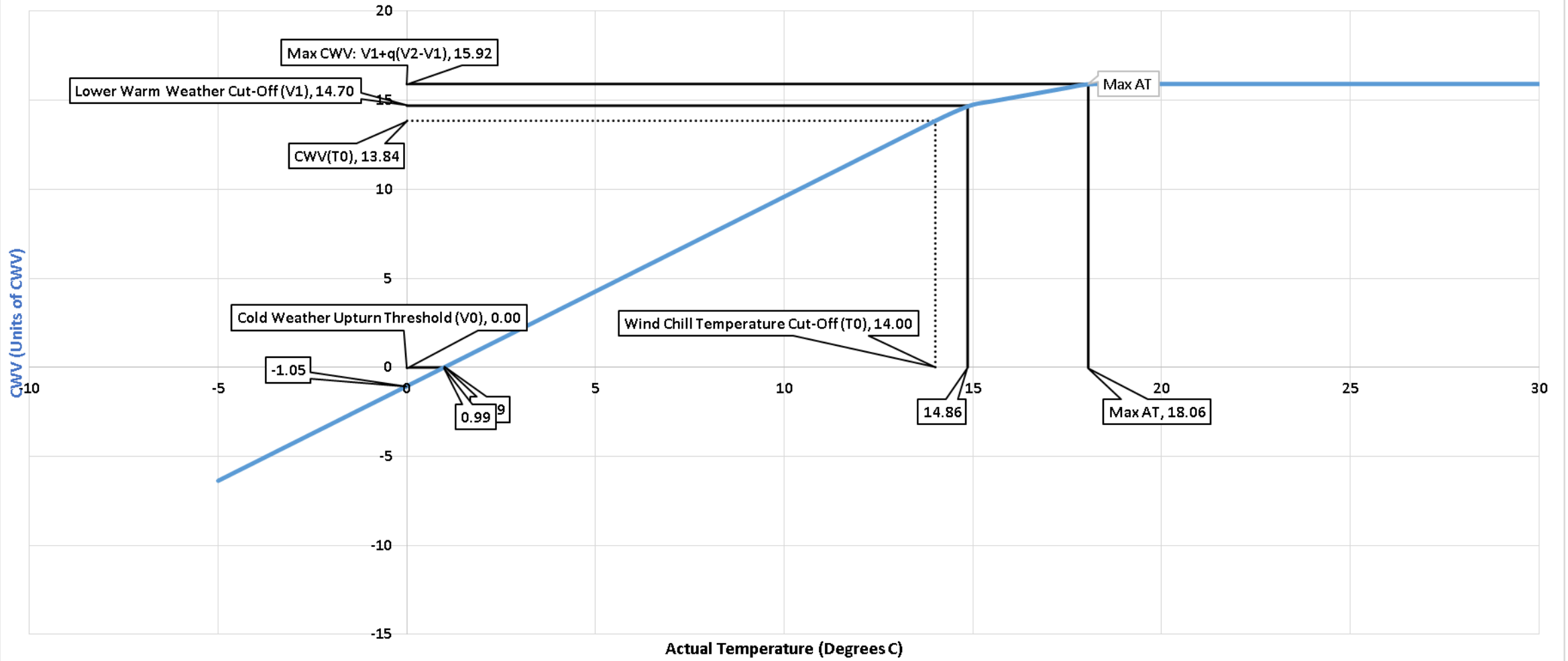
MAPE Variance from 2015 Parameters: NE

	2010	2011	2012	2013	2014	2015	2016	2017	All Years
Jan	0.22%	0.17%	-0.37%	-0.12%	-0.11%	-0.30%	-0.07%	0.06%	-0.07%
Feb	-0.49%	-0.27%	-0.13%	-0.24%	-0.27%	0.00%	0.08%	-0.01%	-0.17%
Mar	0.11%	-2.70%	-0.46%	-0.47%	-0.06%	-0.26%	-0.33%	-0.13%	-0.54%
Apr	-1.38%	-0.46%	-0.31%	-0.81%	-1.90%	-0.60%	-1.58%	-0.07%	-0.89%
May	-1.14%	-0.07%	-1.96%	-1.13%	-0.46%	-1.02%	-1.29%	-2.57%	-1.20%
Jun	-2.03%	-0.70%	-0.39%	0.35%	-2.18%	-0.79%	-0.12%	0.14%	-0.72%
Jul	0.42%	-1.08%	-1.17%	2.20%	-1.48%	0.33%	-0.13%	2.67%	0.22%
Aug	-0.79%	-0.41%	1.54%	-1.78%	1.31%	0.42%	1.18%	0.05%	0.19%
Sep	-1.54%	-0.51%	-0.09%	-0.59%	-1.11%	-0.03%	0.30%	-0.06%	-0.45%
Oct	-0.12%	-0.39%	-0.32%	-0.59%	-0.28%	-0.88%	-0.48%	0.63%	-0.30%
Nov	0.28%	-0.02%	-0.03%	-0.04%	0.41%	-0.35%	-0.26%	0.09%	0.01%
Dec	-0.31%	-0.32%	-0.08%	-0.24%	0.14%	-0.16%	-0.29%	-0.31%	-0.20%
All Months	-0.57%	-0.56%	-0.31%	-0.29%	-0.50%	-0.30%	-0.25%	0.04%	-0.34%

2015

Fixed Wind Speed

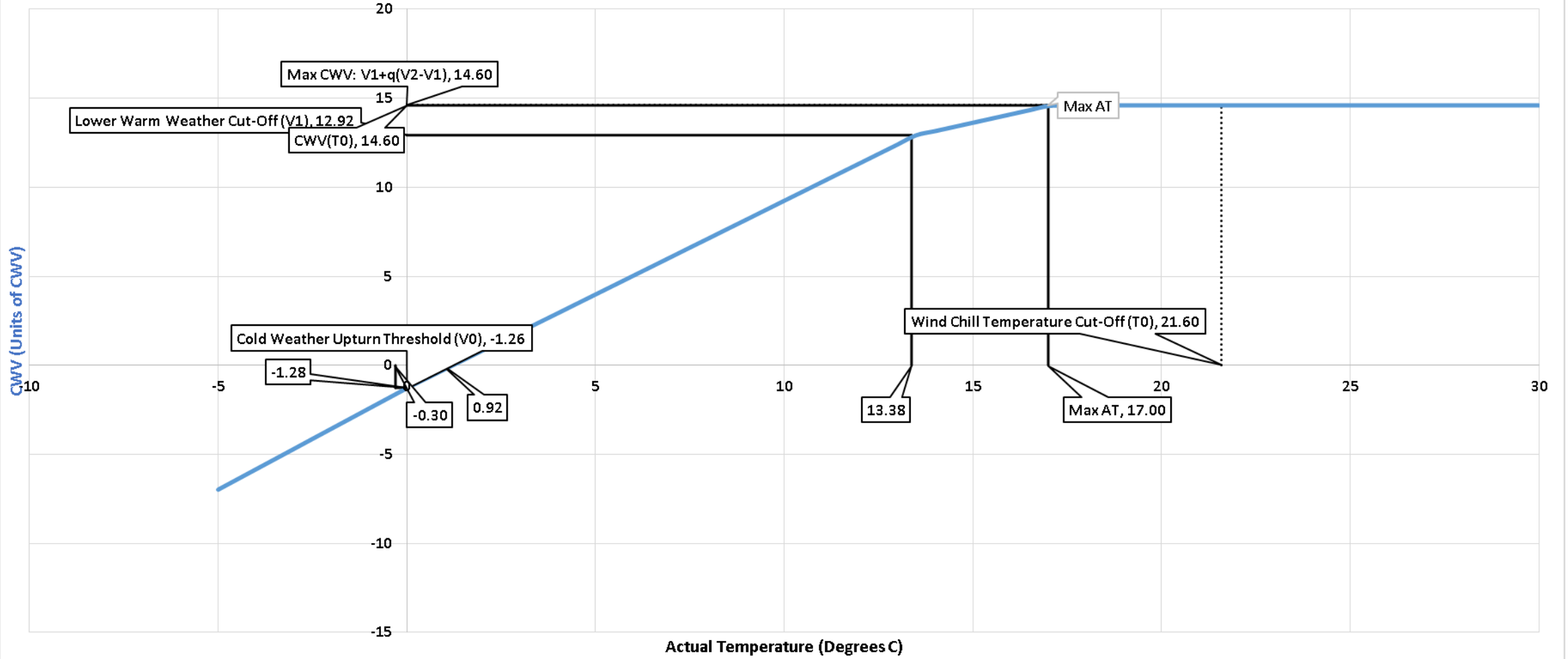
4.00



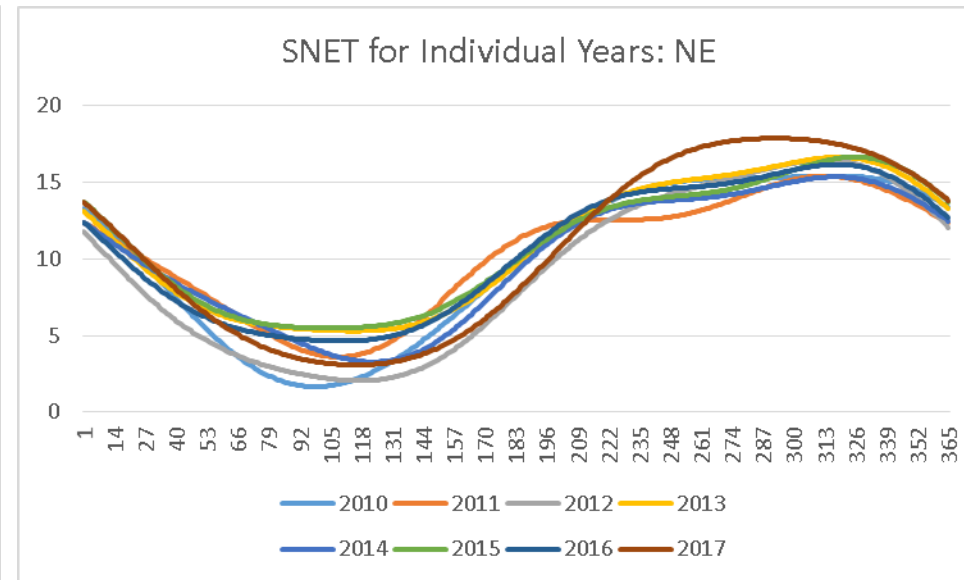
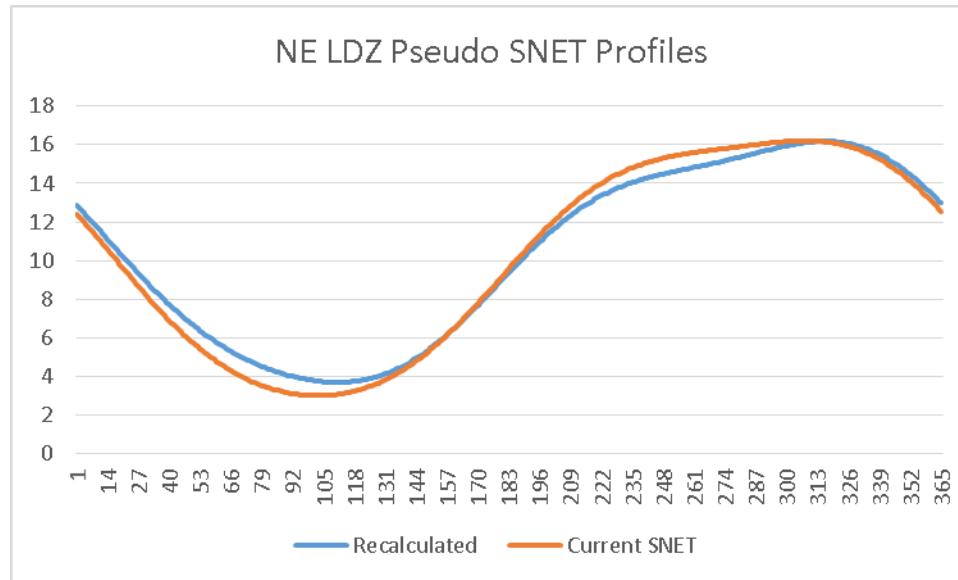
2020

Fixed Wind Speed

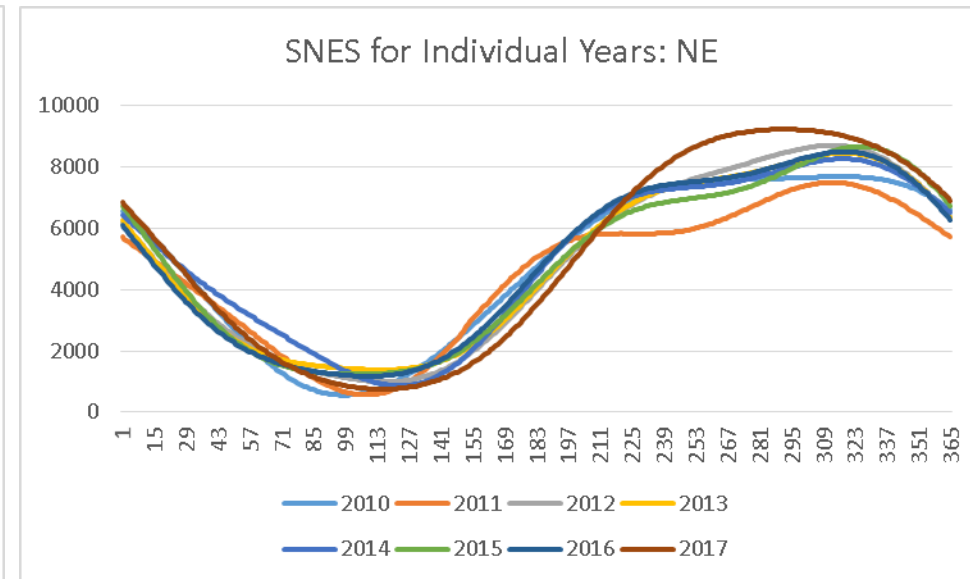
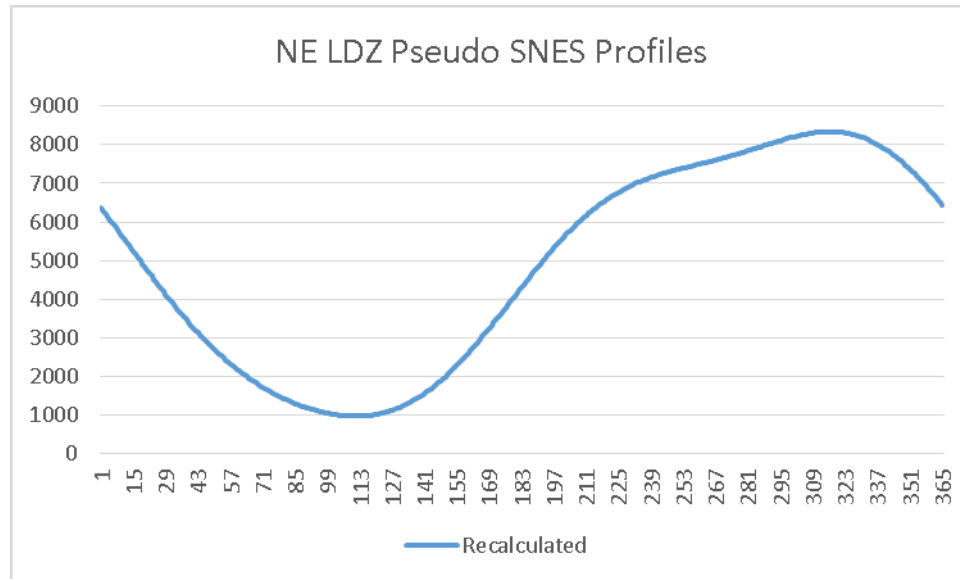
4.00



SNET



SNES



Results: LDZ NO

Parameter	2015	2020
Effective Temperature/AT Weight	0.5	0.4918
Effective Temperature Weight (I1)	0.663	0.646
Wind Chill Weight (I2)	0.009	0.008
Cold Weather Sensitivity (I3)	0.150	0.126
Cold Weather Upturn Threshold (V0)	3.000	5.000
Lower Warm Weather Cut-Off (V1)	13.000	12.005
Upper Warm Weather Cut-Off (V2)	16.000	15.779
Slope Relating to Warm Weather Cut-Off (q)	0.460	0.438
Wind Chill Wind Cut-Off (W0)	0.000	-0.894
Wind Chill Temperature Cut-Off (T0)	14.000	16.657
Solar Radiance Effect (S0)		0.950
R2	0.9859	0.9893

2020 CWV+

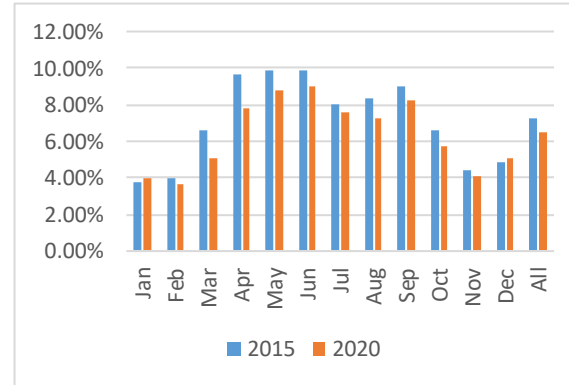
LDZ	Station
NO	Albemarle

Gas Years	2010/11 to 2017/18
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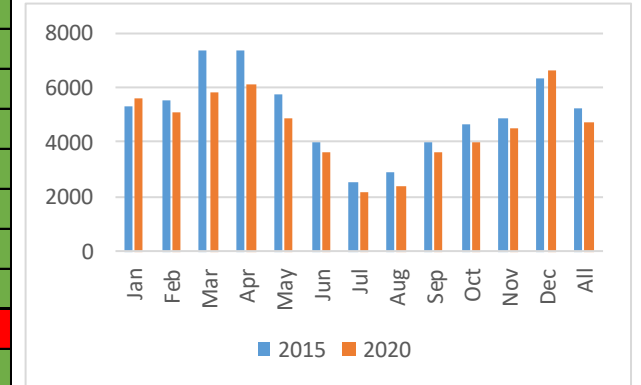
Parameters	Avg. Mean Abs. %Error
2015	7.20%
2020	6.45%

Avg. Adj. R-Sq.	Avg. RMSE (MWhs)	Avg. %diff. in est 1 in20 peak demand
0.9859	5257	
0.9893	4760	

MAPE							
Month	2015	2020	Season				
			Year	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
Jan	3.77%	3.98%	2015	4.21%	8.70%	9.17%	6.75%
Feb	3.94%	3.62%	2020	4.23%	7.20%	8.32%	6.06%
Mar	6.56%	5.07%					
Apr	9.66%	7.82%					
May	9.91%	8.74%					
Jun	9.92%	8.98%					
Jul	8.04%	7.60%					
Aug	8.31%	7.26%					
Sep	9.03%	8.20%					
Oct	6.61%	5.74%					
Nov	4.43%	4.10%					
Dec	4.89%	5.03%					
All	7.20%	6.45%					



RMSE							
Month	2015	2020	Season				
			Year	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
Jan	5281	5598	2015	5790	6861	3204	4172
Feb	5500	5095	2020	5874	5613	2806	4076
Mar	7318	5796					
Apr	7383	6132					
May	5778	4848					
Jun	4025	3604					
Jul	2502	2183					
Aug	2920	2392					
Sep	3972	3646					
Oct	4648	4027					
Nov	4872	4502					
Dec	6340	6652					
All	5257	4760					



2020 CWV+ variance v CWV benchmark

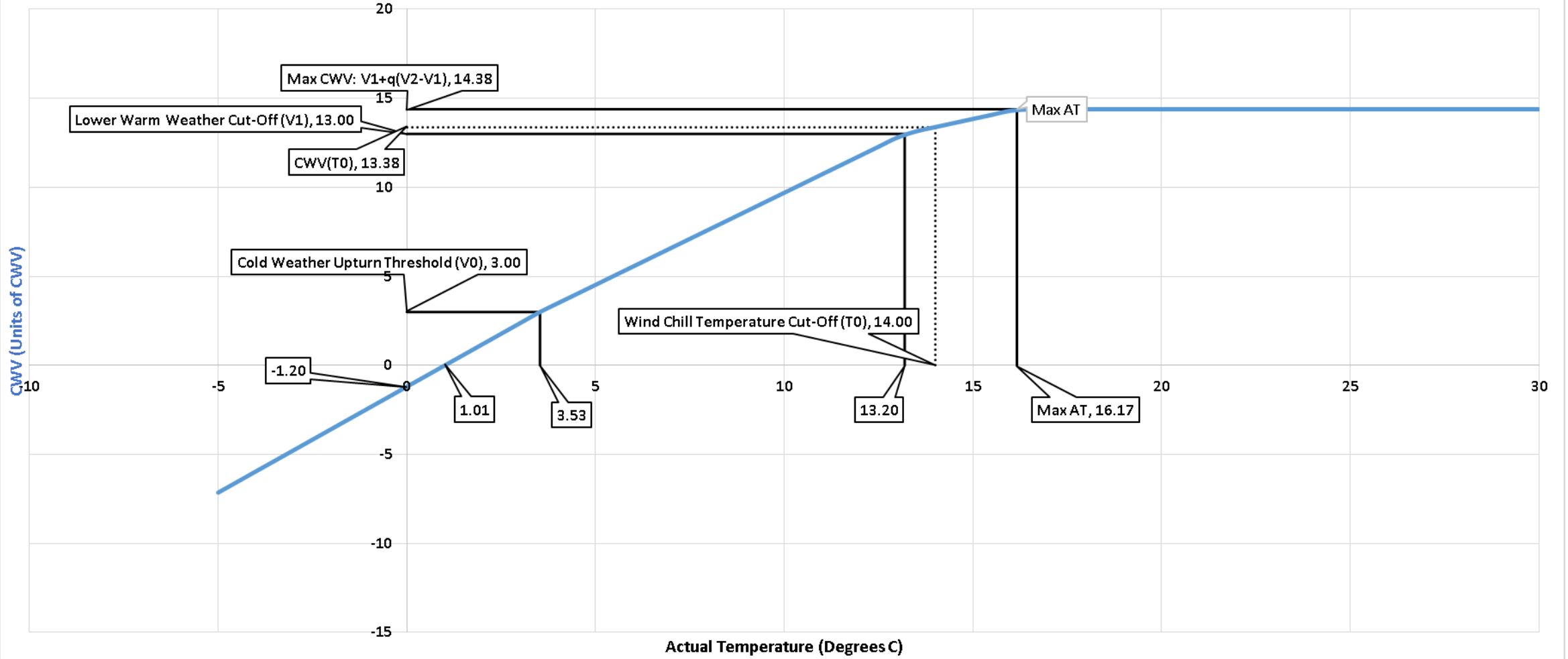
MAPE Variance from 2015 Parameters: NO

	2010	2011	2012	2013	2014	2015	2016	2017	All Years
Jan	0.02%	-0.17%	-0.32%	0.33%	0.01%	1.23%	-0.16%	0.68%	0.20%
Feb	-0.34%	-0.09%	-0.71%	-0.34%	-0.32%	-0.06%	-0.22%	-0.48%	-0.32%
Mar	-1.45%	-3.54%	-1.49%	-1.18%	-0.28%	-0.86%	-1.84%	-1.24%	-1.49%
Apr	-3.33%	-1.34%	-1.14%	-1.93%	-2.44%	-1.49%	-1.57%	-1.43%	-1.83%
May	0.99%	-1.55%	-2.62%	-3.26%	-0.16%	-0.66%	-0.69%	-1.43%	-1.17%
Jun	-1.79%	-0.13%	-0.34%	-0.92%	-1.49%	-2.97%	0.34%	-0.18%	-0.94%
Jul	-0.64%	-2.75%	0.18%	-0.10%	-0.62%	-0.74%	-0.62%	1.71%	-0.45%
Aug	-0.74%	0.02%	-0.25%	-6.00%	-0.52%		-0.03%	-0.92%	-1.21%
Sep	0.25%	-0.38%	-0.73%	-2.59%	-1.58%	-2.12%	0.82%	-0.69%	-0.88%
Oct	0.42%	-0.72%	-0.88%	-0.24%	-2.55%	-0.81%	-2.25%	0.01%	-0.88%
Nov	-0.68%	0.20%	0.01%	0.04%	-0.44%	-0.22%	-0.49%	-1.08%	-0.33%
Dec	0.08%	0.01%	0.73%	0.09%	0.03%	-0.19%	0.11%	0.24%	0.14%
All Months	-0.60%	-0.87%	-0.63%	-1.34%	-0.86%	-0.81%	-0.55%	-0.40%	-0.76%

2015

Fixed Wind Speed

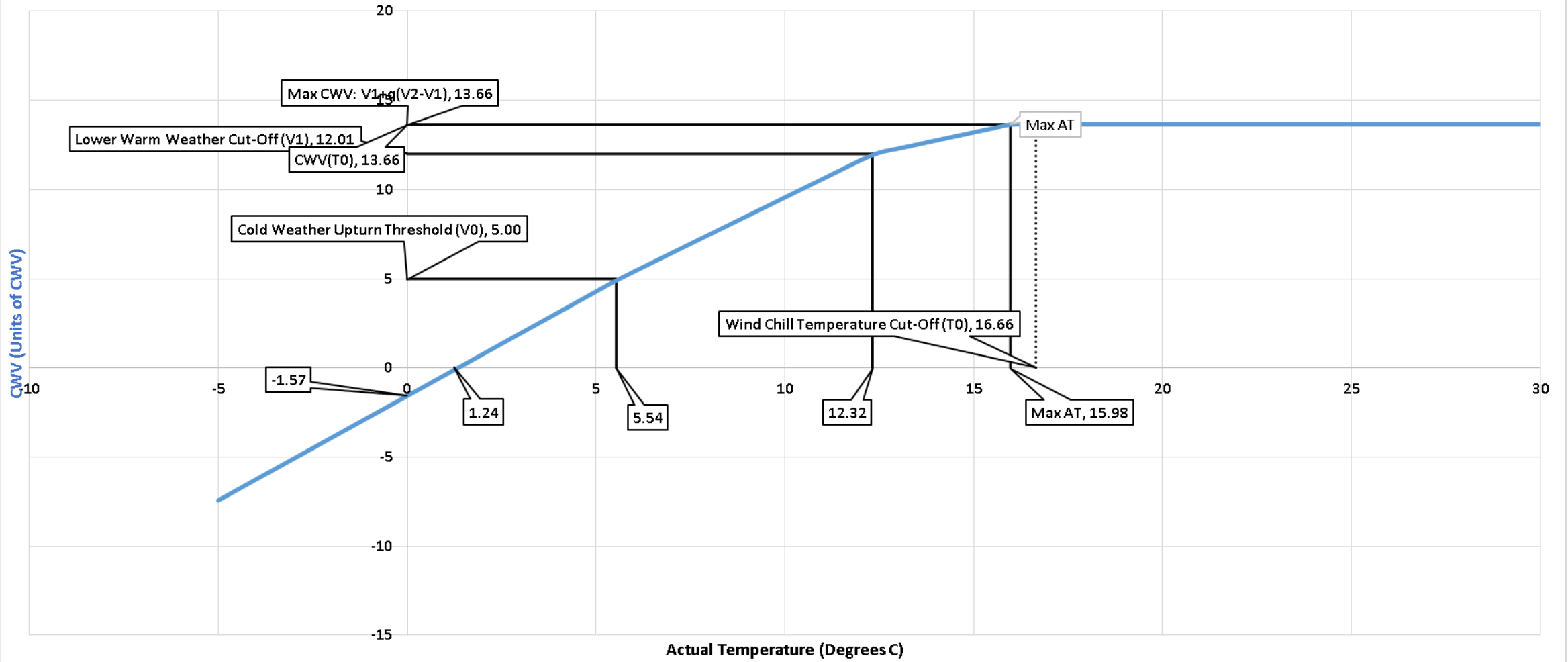
4.00



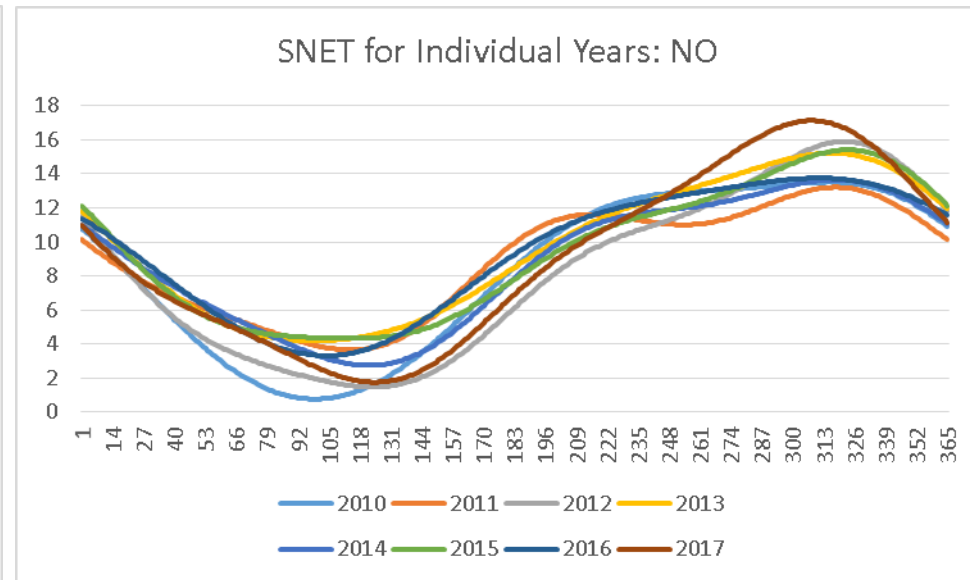
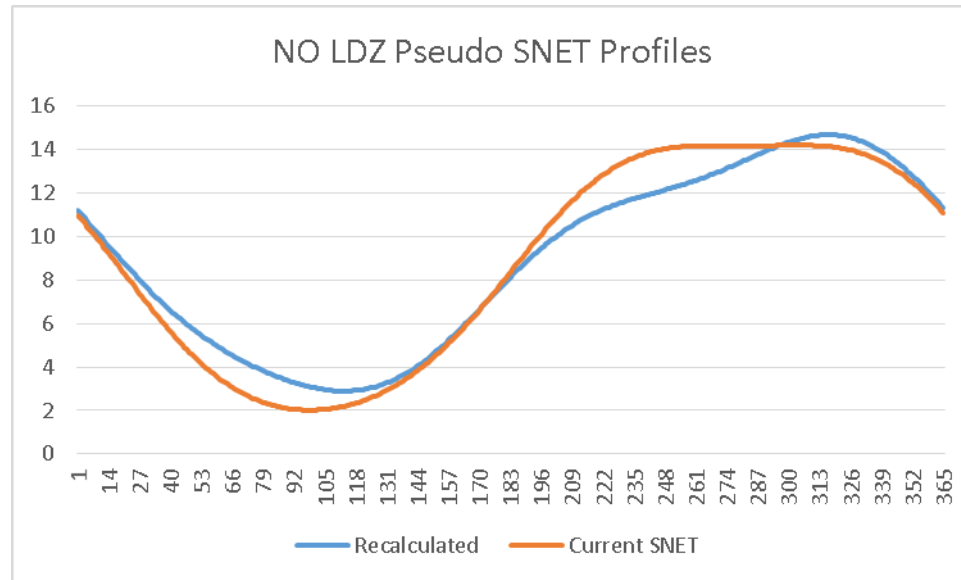
2020

Fixed Wind Speed

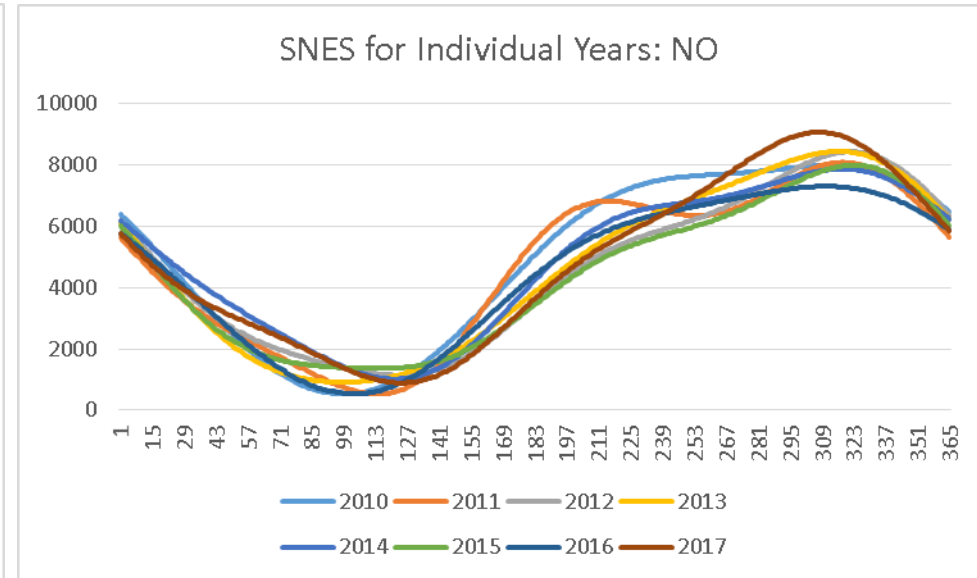
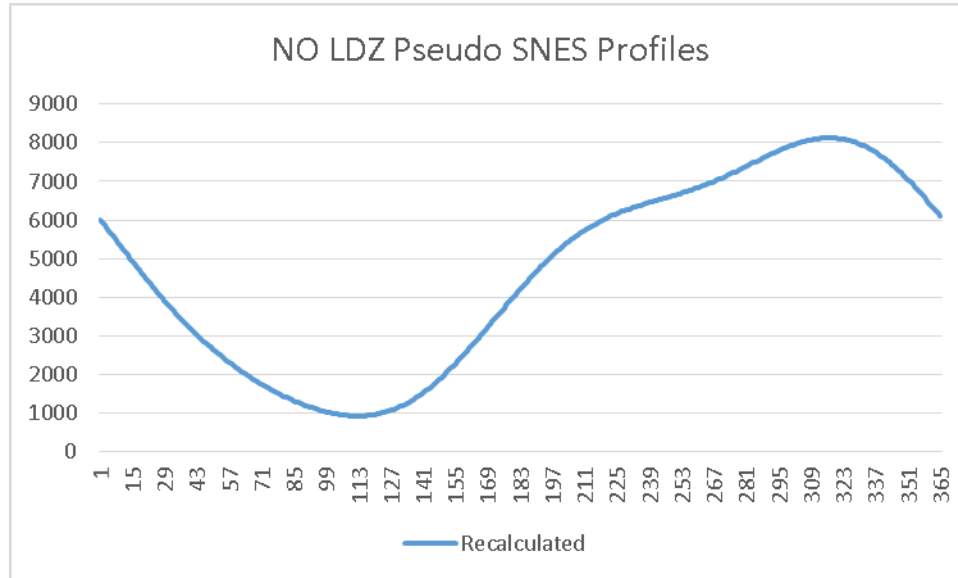
4.00



SNET



SNES



Results: LDZ NT

Parameter	2015	2020
Effective Temperature/AT Weight	0.5	0.4731
Effective Temperature Weight (I1)	0.727	0.715
Wind Chill Weight (I2)	0.015	0.015
Cold Weather Sensitivity (I3)	0.220	0.066
Cold Weather Upturn Threshold (V0)	3.000	4.898
Lower Warm Weather Cut-Off (V1)	15.200	15.029
Upper Warm Weather Cut-Off (V2)	19.200	19.184
Slope Relating to Warm Weather Cut-Off (q)	0.380	0.429
Wind Chill Wind Cut-Off (W0)	0.000	-3.811
Wind Chill Temperature Cut-Off (T0)	14.000	12.833
Solar Radiance Effect (S0)		0.695
R2	0.9930	0.9943

2020 CWV+

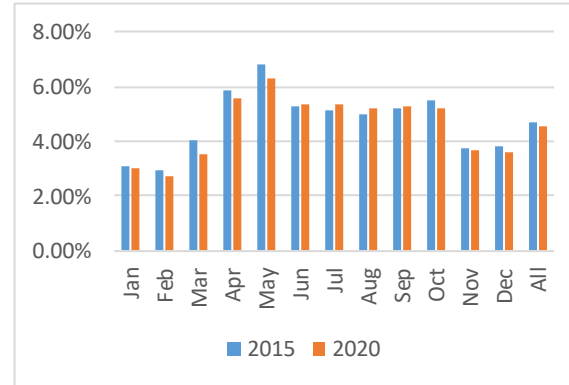
LDZ	Station
NT	Heathrow

Gas Years	2010/11 to 2017/18
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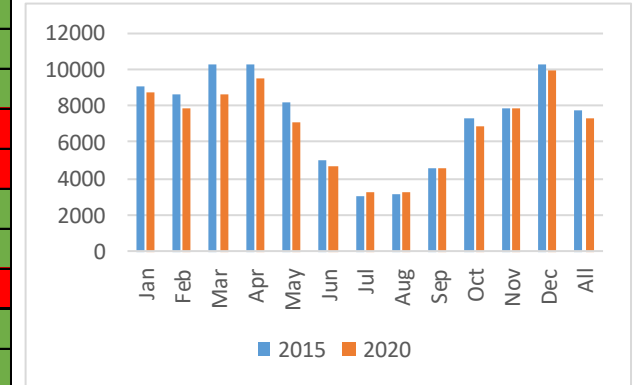
Parameters	Avg. Mean Abs. %Error
2015	4.70%
2020	4.57%

Avg. Adj. R-Sq.	Avg. RMSE (MWhs)	Avg. %diff. in est 1 in20 peak demand
0.9930	7748	
0.9943	7259	

MAPE							
Month	2015	2020	Season				
			Year	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
Jan	3.07%	3.00%	2015	3.28%	5.56%	5.12%	4.82%
Feb	2.92%	2.70%	2020	3.11%	5.11%	5.31%	4.72%
Mar	4.04%	3.49%					
Apr	5.87%	5.58%					
May	6.79%	6.28%					
Jun	5.26%	5.38%					
Jul	5.11%	5.32%					
Aug	4.99%	5.23%					
Sep	5.17%	5.24%					
Oct	5.52%	5.22%					
Nov	3.76%	3.67%					
Dec	3.82%	3.58%					
All	4.70%	4.57%					



RMSE							
Month	2015	2020	Season				
			Year	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
Jan	9072	8777	2015	9483	9616	3811	6596
Feb	8569	7852	2020	9031	8451	3790	6607
Mar	10281	8606					
Apr	10238	9512					
May	8205	7095					
Jun	4993	4665					
Jul	3059	3218					
Aug	3104	3272					
Sep	4550	4538					
Oct	7360	6876					
Nov	7882	7899					
Dec	10308	9972					
All	7748	7259					



2020 CWV+ variance v CWV benchmark

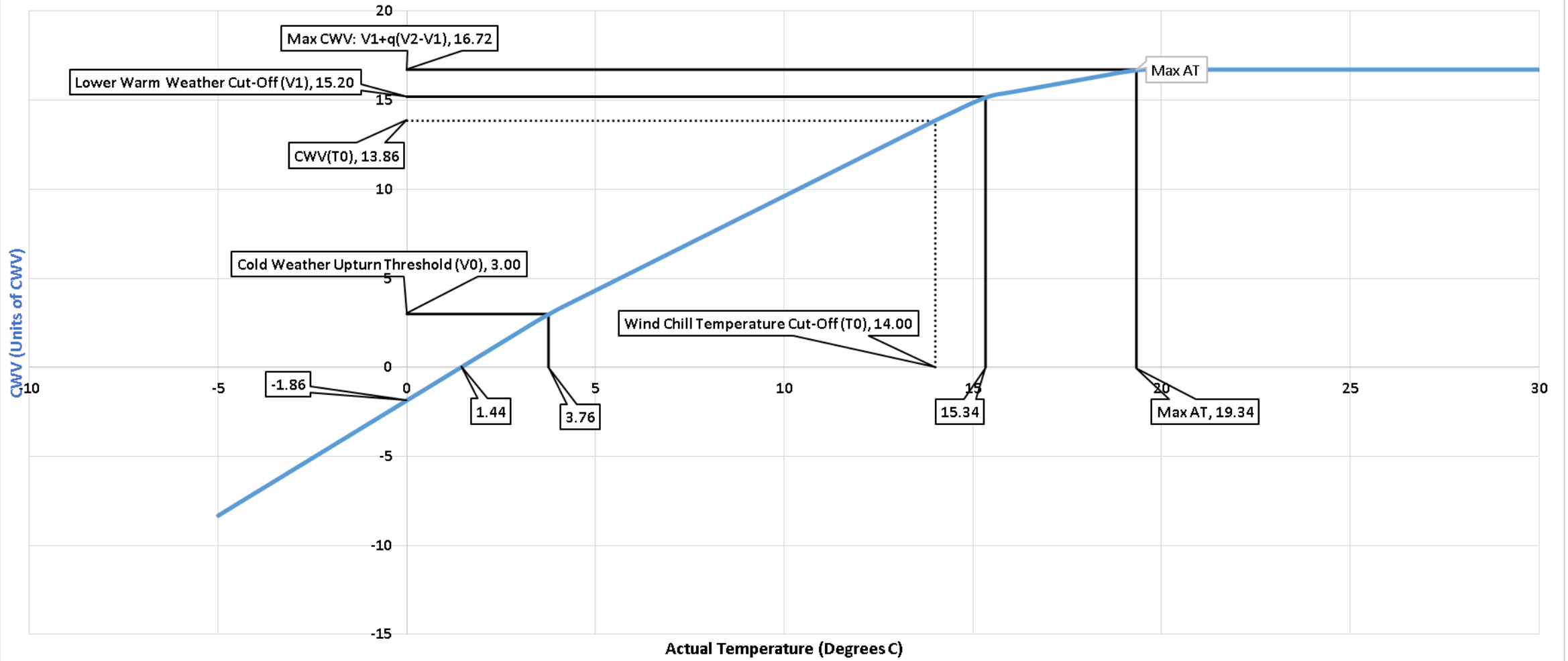
MAPE Variance from 2015 Parameters: NT

	2010	2011	2012	2013	2014	2015	2016	2017	All Years
Jan	0.18%	-0.22%	-0.58%	0.00%	0.29%	0.11%	-0.38%	0.04%	-0.07%
Feb	0.16%	-0.01%	-0.65%	-0.68%	-0.13%	0.08%	-0.24%	-0.32%	-0.22%
Mar	-0.51%	-0.04%	-1.10%	-0.91%	-0.56%	-0.40%	-0.37%	-0.52%	-0.55%
Apr	0.25%	0.17%	-0.15%	-0.03%	-0.34%	-0.73%	-0.09%	-1.43%	-0.29%
May	0.86%	-1.36%	-1.04%	-0.47%	-0.38%	-0.71%	-1.02%	0.10%	-0.50%
Jun	0.76%	-1.03%	-1.15%	0.85%	0.20%	-0.37%	0.72%	0.98%	0.12%
Jul	1.15%	-0.18%	0.06%	0.42%	0.70%	0.37%	0.24%	-1.07%	0.21%
Aug	0.81%	0.09%	0.38%	-0.29%	0.29%	0.43%	0.28%	-0.12%	0.23%
Sep	-0.04%	0.13%	-0.48%	0.40%	-0.41%	1.37%	-0.61%	0.21%	0.07%
Oct	-0.18%	-0.58%	-0.22%	-0.39%	0.57%	-0.73%	-0.05%	-0.84%	-0.30%
Nov	0.43%	-0.23%	-0.63%	-0.06%	-0.59%	0.46%	0.31%	-0.36%	-0.08%
Dec	-0.39%	-0.43%	-0.94%	-0.13%	-0.09%	0.48%	-0.18%	-0.19%	-0.23%
All Months	0.29%	-0.31%	-0.54%	-0.11%	-0.04%	0.03%	-0.12%	-0.29%	-0.14%

2015

Fixed Wind Speed

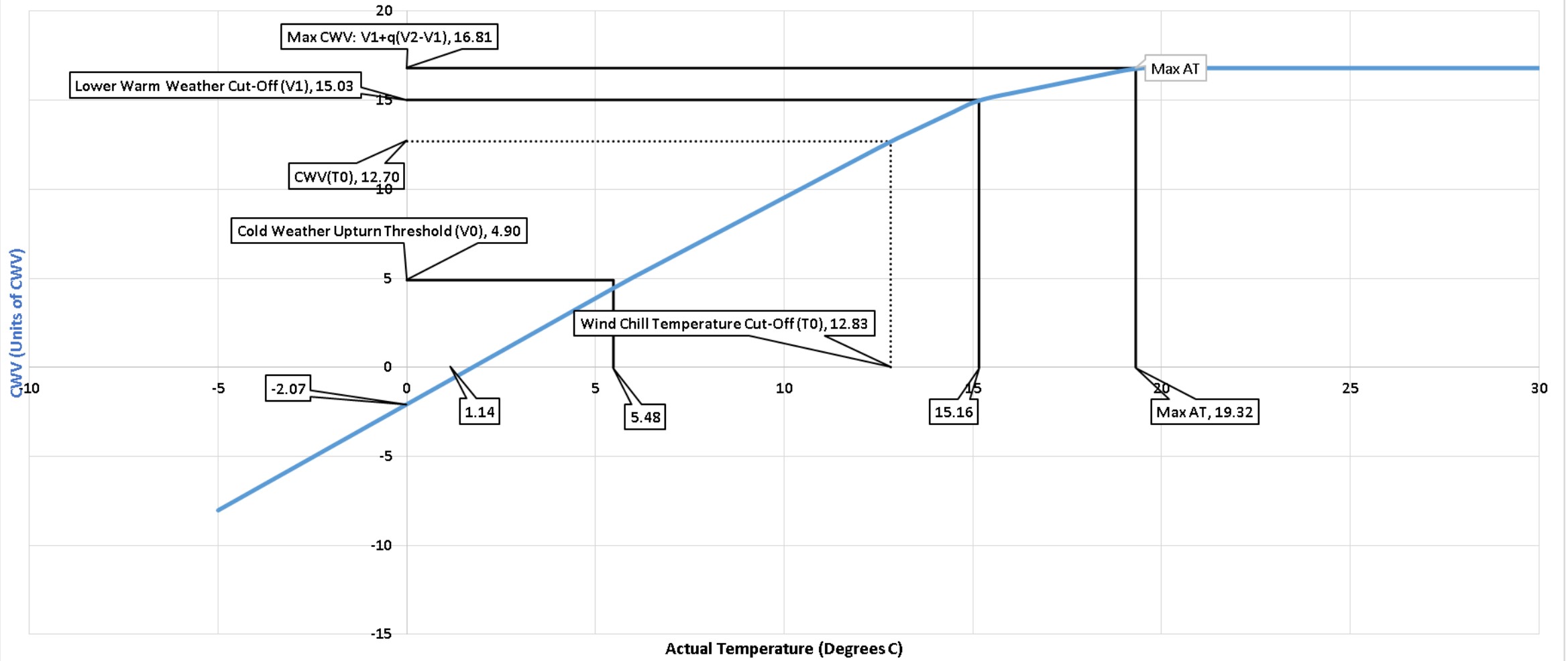
4.00



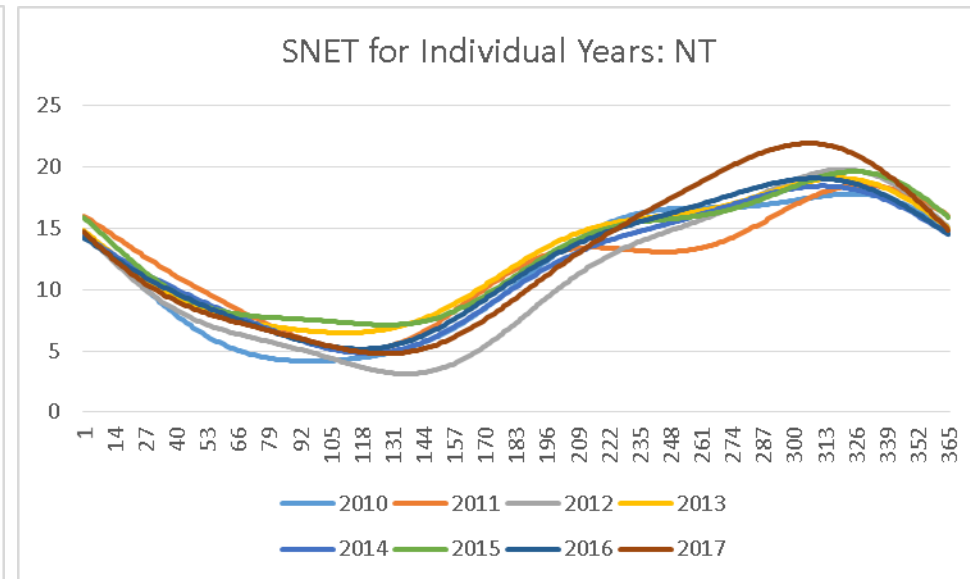
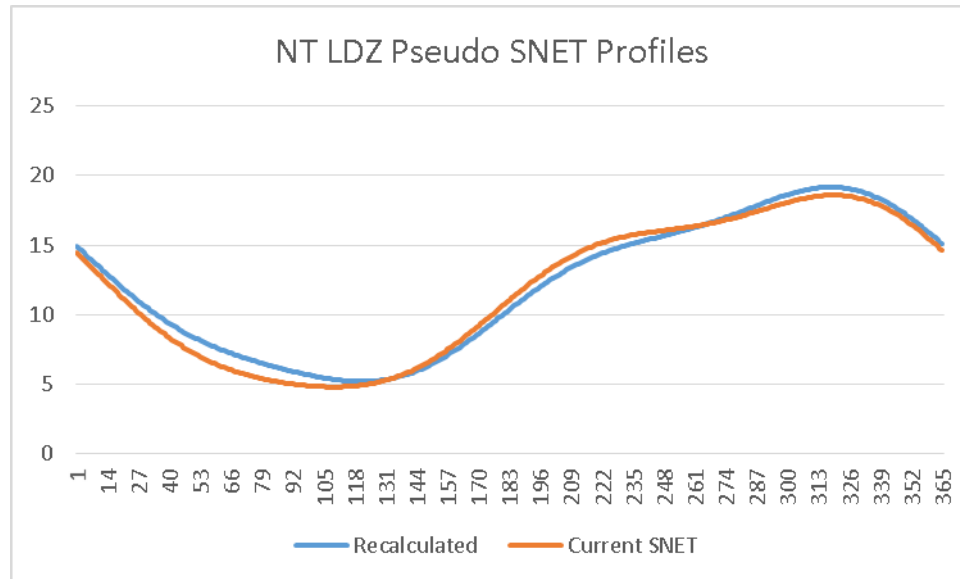
2020

Fixed Wind Speed

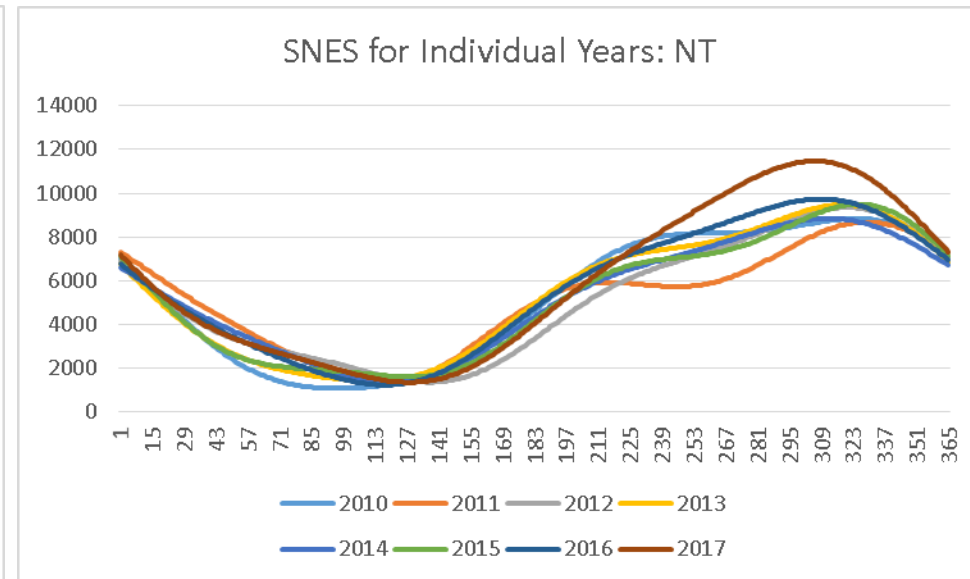
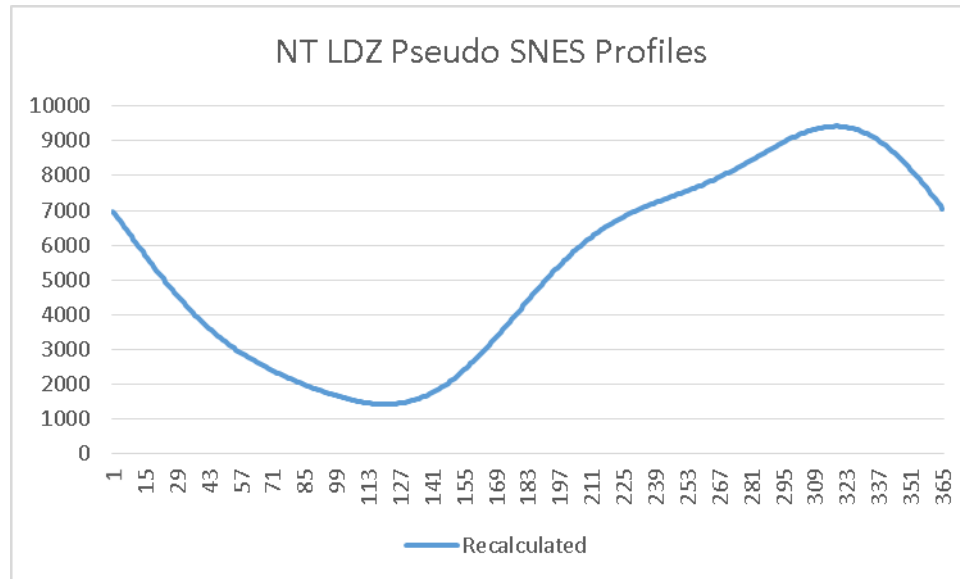
— 4.00



SNET



SNES



Results: LDZ NW

Parameter	2015	2020
Effective Temperature/AT Weight	0.5	0.4983
Effective Temperature Weight (I1)	0.697	0.646
Wind Chill Weight (I2)	0.015	0.009
Cold Weather Sensitivity (I3)	0.300	0.315
Cold Weather Upturn Threshold (V0)	3.000	2.694
Lower Warm Weather Cut-Off (V1)	14.900	12.775
Upper Warm Weather Cut-Off (V2)	18.000	16.466
Slope Relating to Warm Weather Cut-Off (q)	0.380	0.513
Wind Chill Wind Cut-Off (W0)	0.000	-5.000
Wind Chill Temperature Cut-Off (T0)	14.000	21.312
Solar Radiance Effect (S0)		0.802
R2	0.9890	0.9913

2020 CWV+

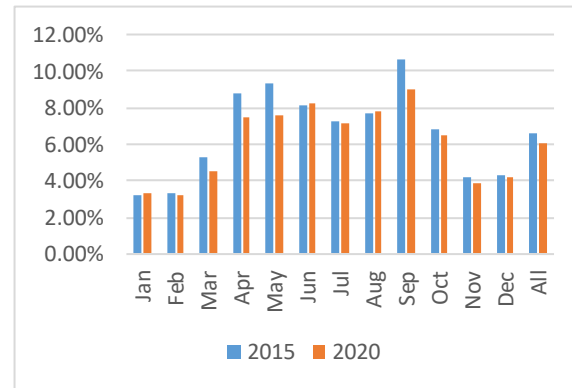
LDZ	Station
NW	Manchester Rostherne

Gas Years	2010/11 to 2017/18
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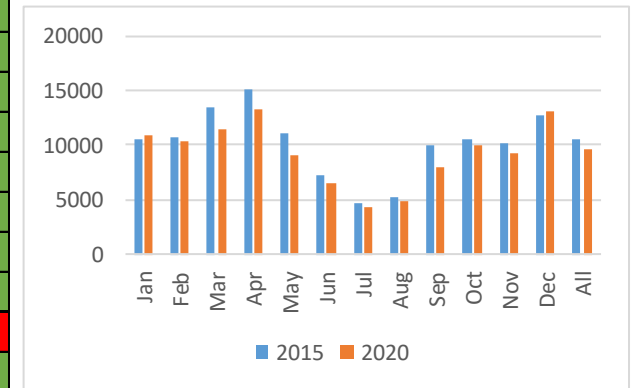
Parameters	Avg. Mean Abs. %Error
2015	6.59%
2020	6.07%

Avg. Adj. R-Sq.	Avg. RMSE (MWhs)	Avg. %diff. in est 1 in20 peak demand
0.9890	10536	
0.9913	9647	

MAPE							
Month	2015	2020	Season				
			Year	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
Jan	3.25%	3.36%	2015	3.64%	7.76%	7.72%	7.19%
Feb	3.34%	3.16%	2020	3.60%	6.48%	7.71%	6.45%
Mar	5.26%	4.47%					
Apr	8.74%	7.46%					
May	9.31%	7.53%					
Jun	8.12%	8.20%					
Jul	7.31%	7.14%					
Aug	7.74%	7.81%					
Sep	10.63%	9.05%					
Oct	6.80%	6.49%					
Nov	4.15%	3.83%					
Dec	4.30%	4.24%					
All	6.59%	6.07%					



RMSE							
Month	2015	2020	Season				
			Year	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
Jan	10596	10866	2015	11415	13290	5811	9750
Feb	10717	10343	2020	11533	11382	5311	9101
Mar	13368	11484					
Apr	15169	13236					
May	11082	9111					
Jun	7271	6509					
Jul	4604	4389					
Aug	5280	4843					
Sep	9979	7905					
Oct	10443	9919					
Nov	10247	9334					
Dec	12633	13031					
All	10536	9647					



2020 CWV+ variance v CWV benchmark

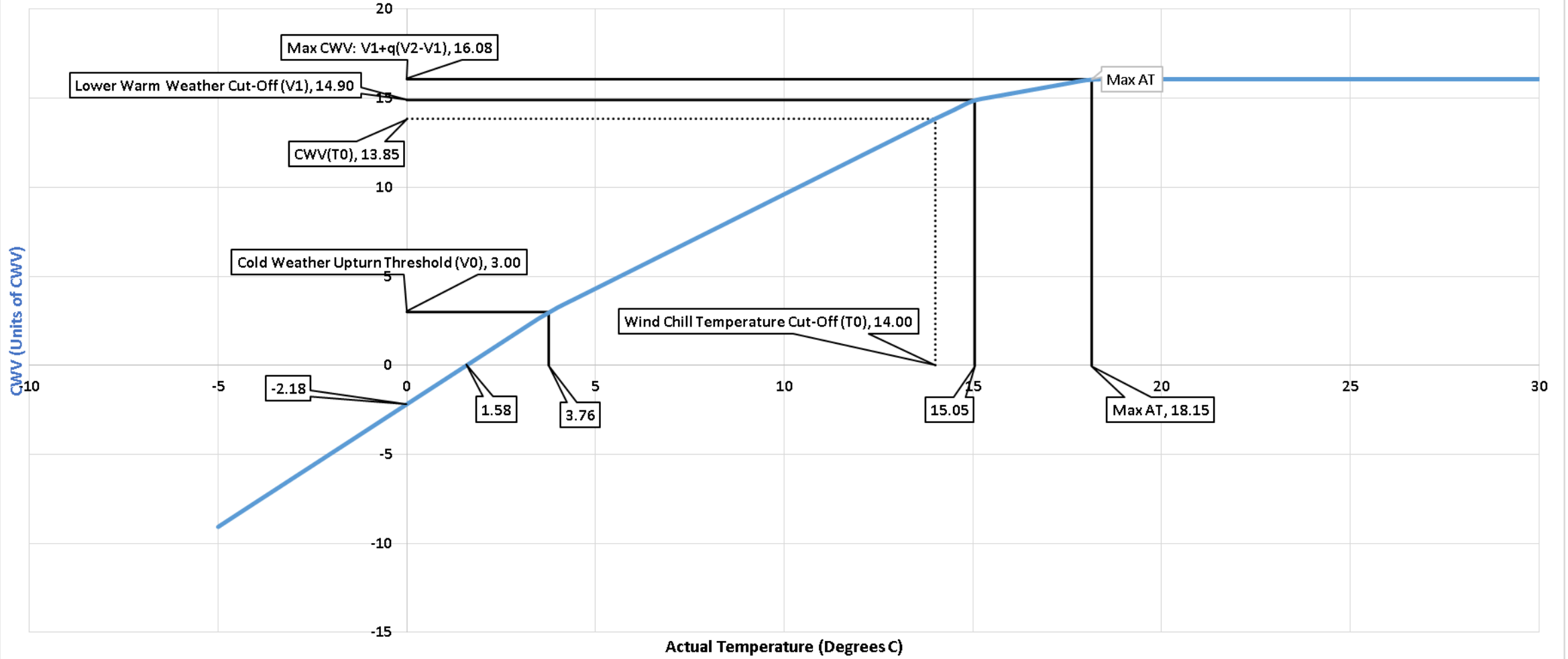
MAPE Variance from 2015 Parameters: NW

	2010	2011	2012	2013	2014	2015	2016	2017	All Years
Jan	0.07%	0.35%	0.32%	0.28%	-0.22%	-0.26%	0.03%	0.33%	0.11%
Feb	-0.37%	0.02%	0.66%	-0.25%	-0.49%	-0.12%	-0.70%	-0.19%	-0.18%
Mar	-0.44%	-2.19%	0.43%	-0.85%	-0.71%	-0.99%	-1.38%	-0.21%	-0.79%
Apr	-2.54%	-1.00%	1.24%	-1.45%	-2.15%	-1.59%	-1.58%	-1.16%	-1.28%
May	-2.60%	-1.18%	-1.61%	-1.80%	-0.73%	-1.41%	-2.91%	-2.03%	-1.78%
Jun	-1.48%	-1.60%	4.72%	0.18%	-3.26%	1.93%	-2.95%	3.08%	0.08%
Jul	1.76%	-2.83%	1.70%	0.27%	-1.91%	-0.51%	-0.54%	0.73%	-0.16%
Aug	-0.02%	0.04%	2.14%	-1.31%	0.55%	-0.21%	0.23%	-0.81%	0.08%
Sep	-0.95%	-0.05%	1.31%	-1.86%	-7.43%	-0.07%	-1.82%	-1.78%	-1.58%
Oct	0.10%	-0.88%	4.48%	0.14%	-1.76%	-2.54%	-2.67%	0.62%	-0.31%
Nov	-0.32%	-0.17%	-0.90%	0.34%	-0.06%	-1.04%	-0.26%	-0.22%	-0.33%
Dec	0.75%	0.81%	-0.51%	-0.55%	-1.10%	0.11%	-0.18%	0.19%	-0.06%
All Months	-0.50%	-0.72%	1.16%	-0.57%	-1.61%	-0.56%	-1.23%	-0.12%	-0.52%

2015

Fixed Wind Speed

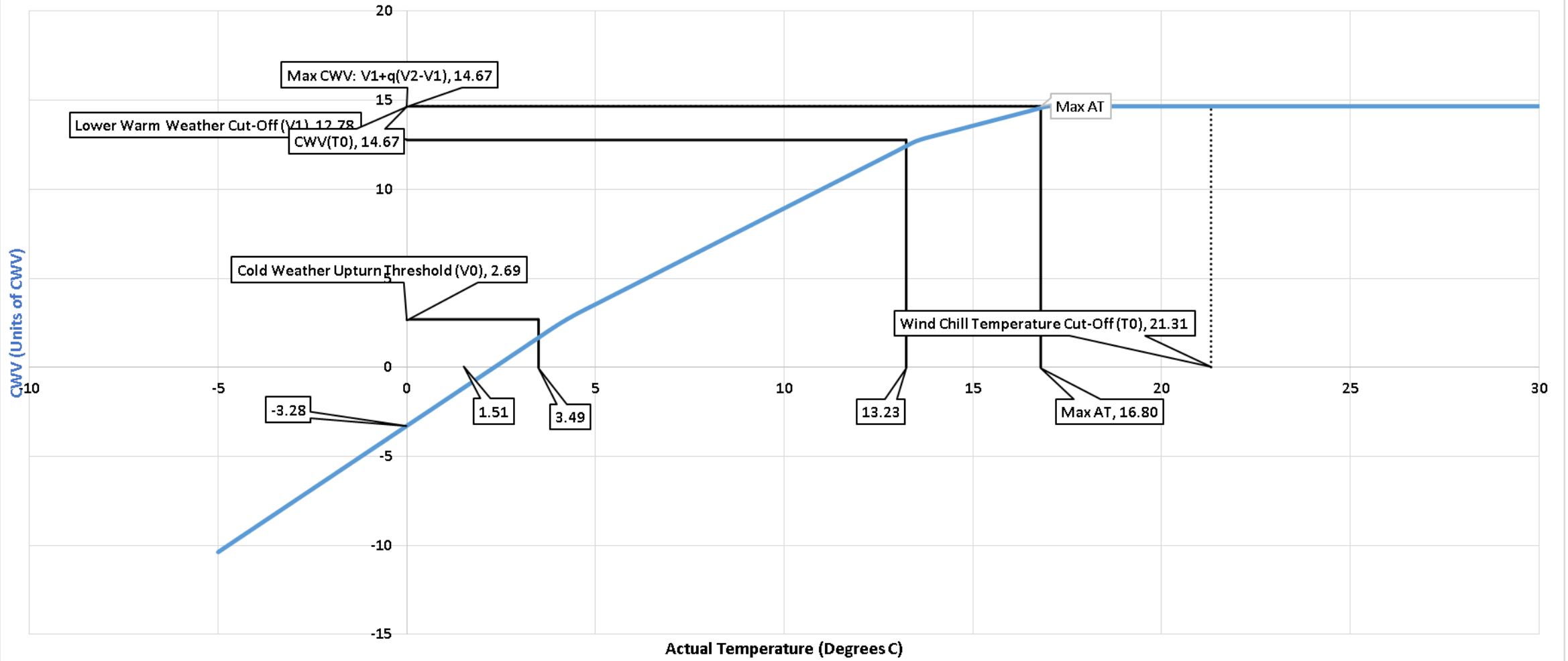
4.00



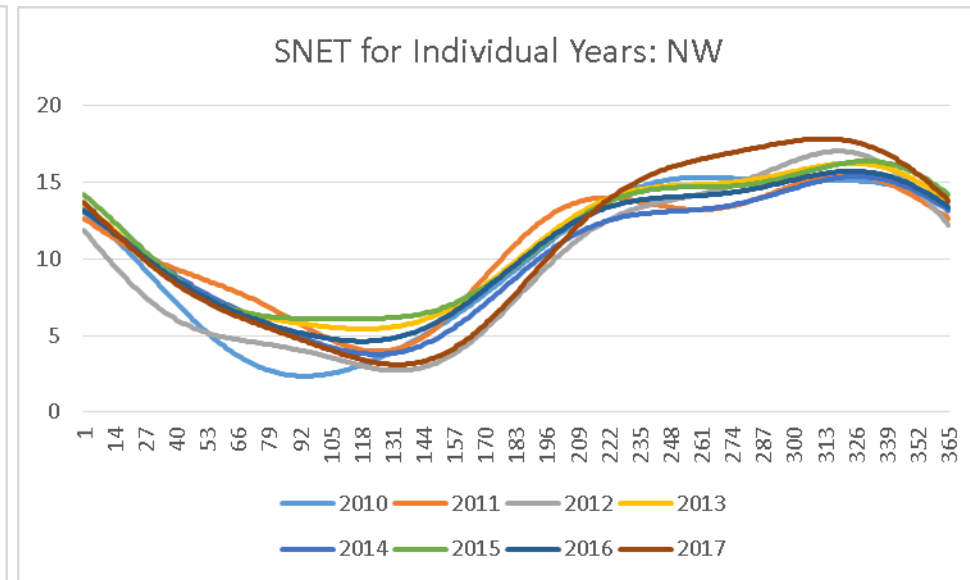
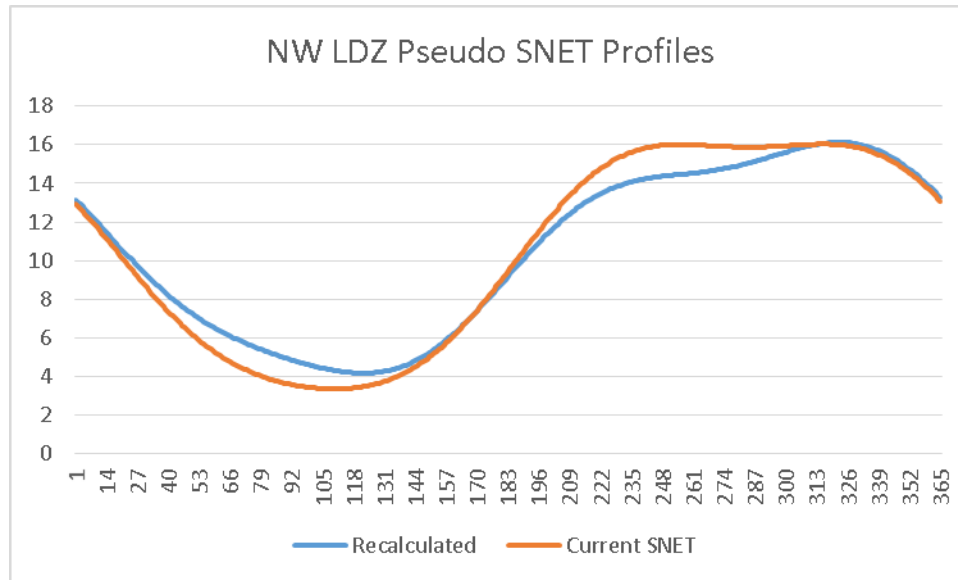
2020

Fixed Wind Speed

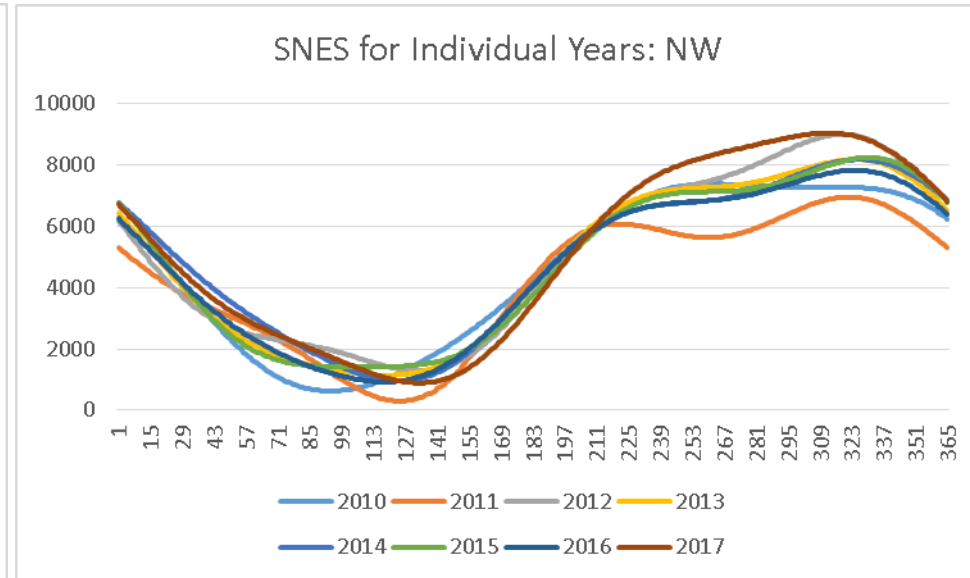
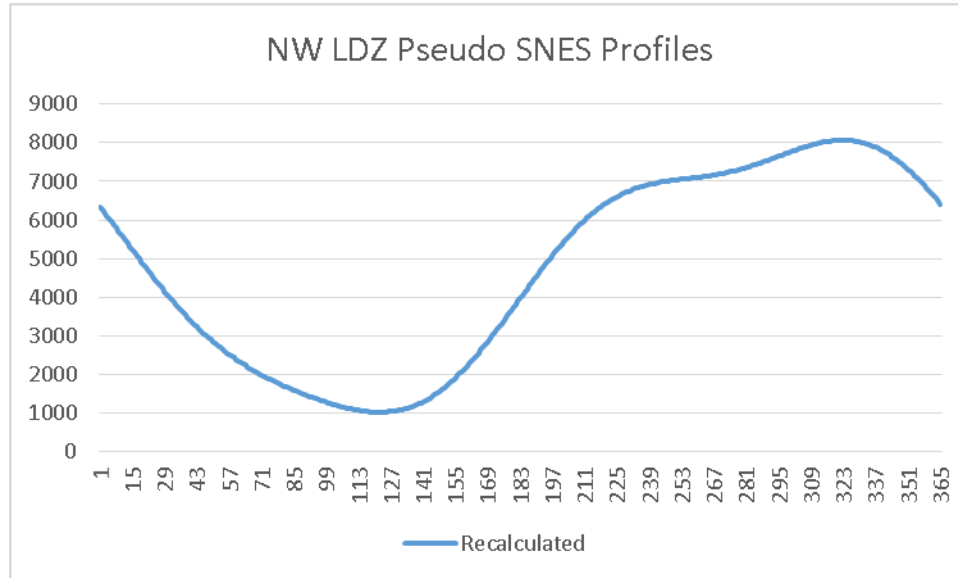
4.00



SNET



SNES



Results: LDZ SC

Parameter	2015	2020
Effective Temperature/AT Weight	0.5	0.5049
Effective Temperature Weight (I1)	0.635	0.680
Wind Chill Weight (I2)	0.012	0.011
Cold Weather Sensitivity (I3)	0.150	0.000
Cold Weather Upturn Threshold (V0)	3.000	1.053
Lower Warm Weather Cut-Off (V1)	12.200	12.590
Upper Warm Weather Cut-Off (V2)	16.000	16.402
Slope Relating to Warm Weather Cut-Off (q)	0.640	0.509
Wind Chill Wind Cut-Off (W0)	0.000	-2.992
Wind Chill Temperature Cut-Off (T0)	14.000	15.476
Solar Radiance Effect (S0)		0.507
R2	0.9892	0.9903

2020 CWV+

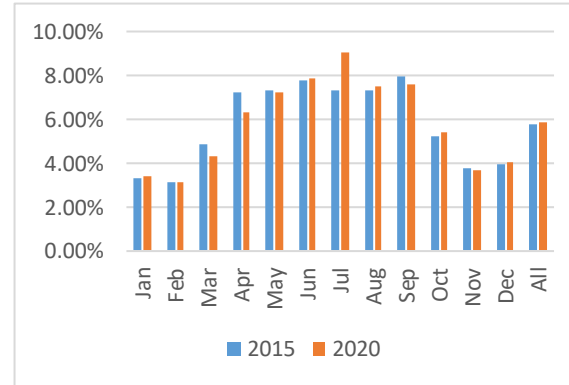
LDZ	Station
SC	Glasgow Bishopton

Gas Years	2010/11 to 2017/18
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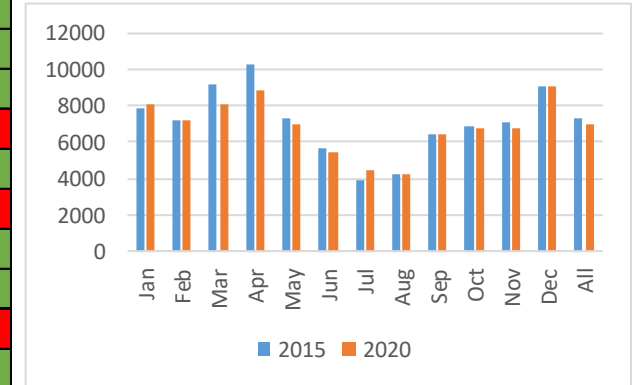
Parameters	Avg. Mean Abs. %Error
2015	5.79%
2020	5.82%

Avg. Adj. R-Sq.	Avg. RMSE (MWhs)	Avg. %diff. in est 1 in20 peak demand
0.9892	7330	
0.9903	7023	

MAPE							
Month	2015	2020	Season				
			Year	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
Jan	3.33%	3.44%	2015	3.49%	6.43%	7.55%	5.67%
Feb	3.14%	3.09%	2020	3.54%	5.94%	8.22%	5.55%
Mar	4.83%	4.28%					
Apr	7.20%	6.29%					
May	7.29%	7.27%					
Jun	7.76%	7.90%					
Jul	7.36%	9.04%					
Aug	7.33%	7.47%					
Sep	7.94%	7.60%					
Oct	5.27%	5.43%					
Nov	3.81%	3.64%					
Dec	3.97%	4.05%					
All	5.79%	5.82%					



RMSE							
Month	2015	2020	Season				
			Year	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
Jan	7867	8060	2015	8151	9014	4653	6640
Feb	7232	7235	2020	8211	8008	4718	6641
Mar	9219	8081					
Apr	10304	8888					
May	7310	6970					
Jun	5679	5414					
Jul	3874	4478					
Aug	4227	4190					
Sep	6389	6392					
Oct	6882	6741					
Nov	7100	6778					
Dec	9028	9050					
All	7330	7023					



2020 CWV+ variance v CWV benchmark

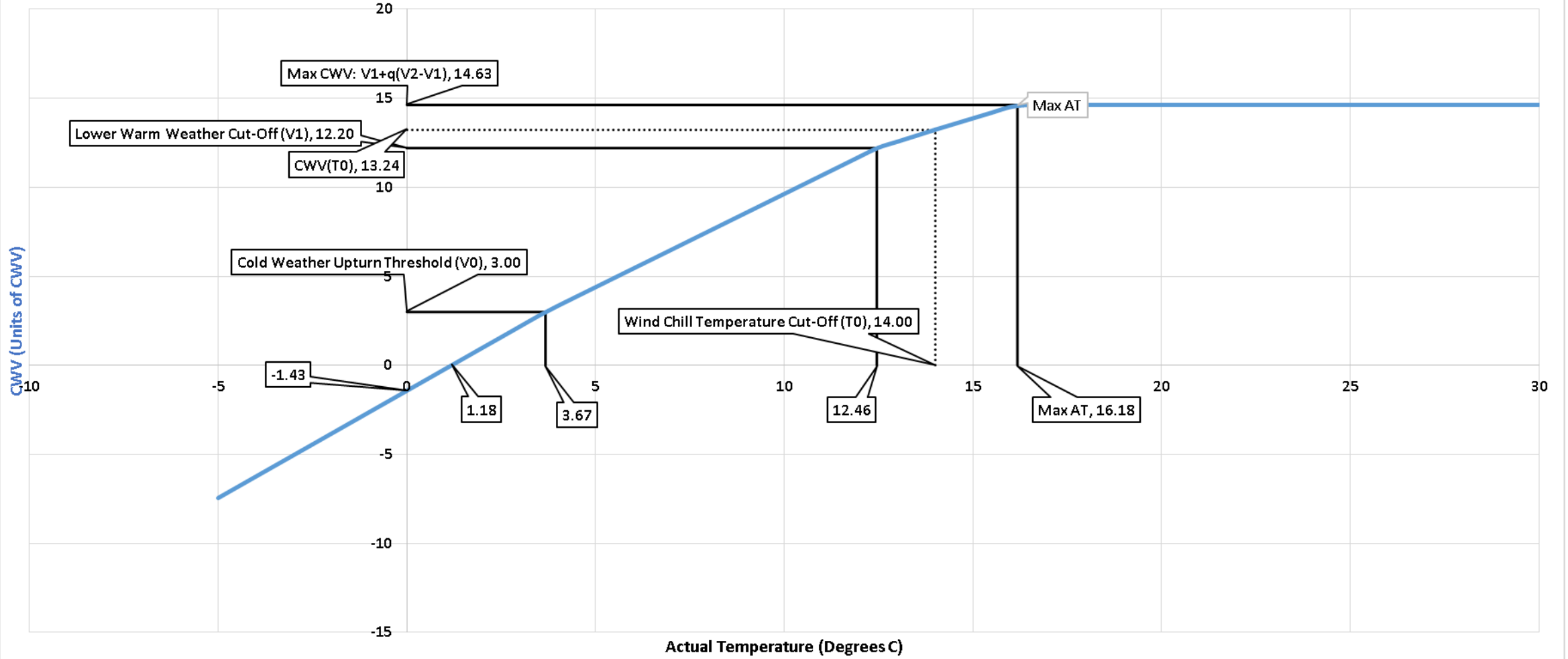
MAPE Variance from 2015 Parameters: SC

	2010	2011	2012	2013	2014	2015	2016	2017	All Years
Jan	0.35%	0.21%	-0.66%	0.19%	0.02%	0.20%	0.21%	0.32%	0.11%
Feb	-0.25%	0.23%	-0.26%	0.08%	-0.13%	0.45%	-0.28%	-0.20%	-0.04%
Mar	0.00%	-1.73%	-0.40%	-0.21%	-0.41%	-0.31%	-0.42%	-0.91%	-0.55%
Apr	-2.03%	-0.28%	-0.59%	-0.37%	-1.52%	-0.85%	-0.54%	-1.13%	-0.91%
May	0.71%	0.63%	-0.16%	-0.52%	0.09%	0.36%	-0.25%	-1.03%	-0.02%
Jun	1.14%	-1.34%	1.07%	0.73%	-0.57%	0.48%	-1.25%	0.86%	0.14%
Jul	-2.34%	-0.38%	0.44%	6.24%	1.57%	3.91%	1.23%	3.46%	1.77%
Aug	-1.24%	-0.18%	1.54%	1.10%	-0.47%	0.05%	0.07%	0.27%	0.14%
Sep	1.42%	-1.13%	0.94%	-2.56%	-0.61%	-1.81%	0.87%	0.15%	-0.34%
Oct	0.92%	-0.98%	-0.30%	1.73%	0.62%	-1.04%	-0.18%	0.48%	0.16%
Nov	0.08%	-0.86%	0.02%	0.12%	-0.34%	-0.11%	-0.28%	0.03%	-0.17%
Dec	-0.03%	-0.20%	0.30%	0.10%	0.27%	-0.04%	0.40%	-0.15%	0.08%
All Months	-0.11%	-0.50%	0.16%	0.55%	-0.12%	0.11%	-0.04%	0.18%	0.03%

2015

Fixed Wind Speed

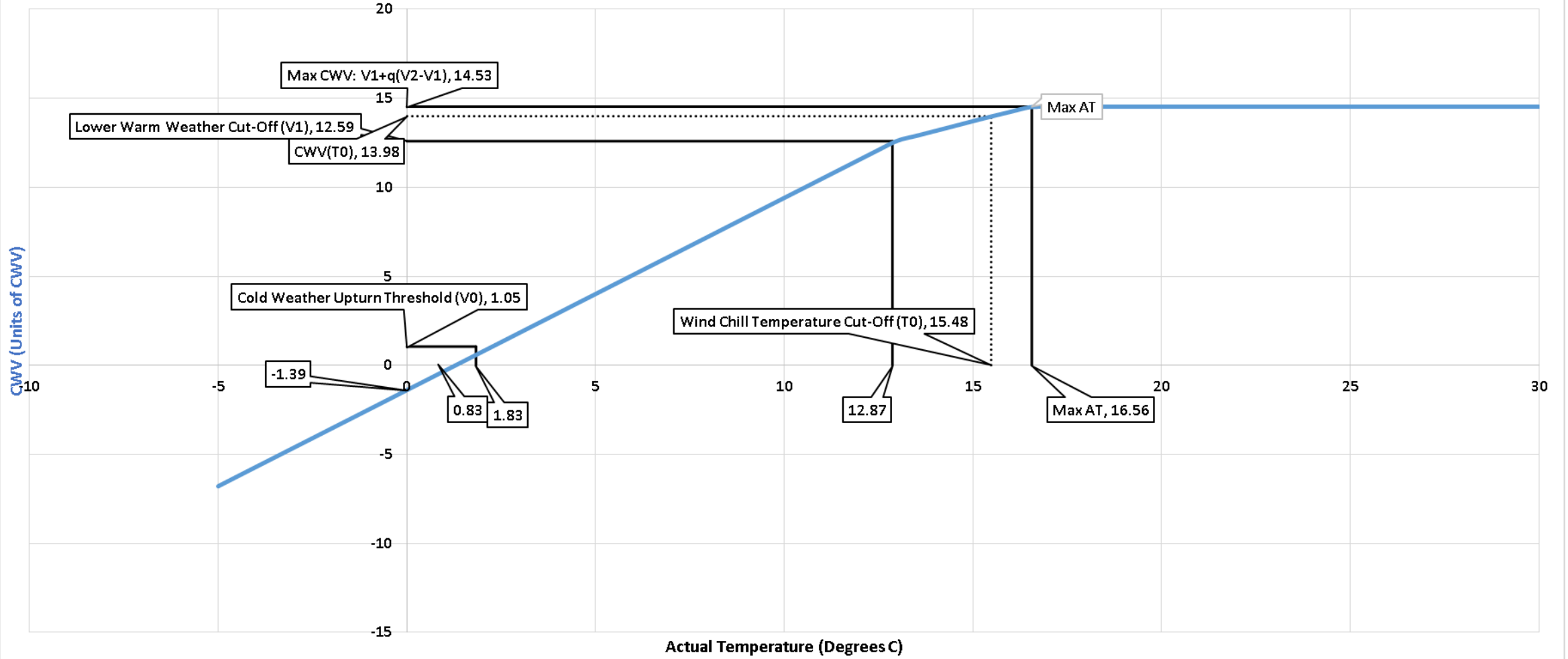
4.00



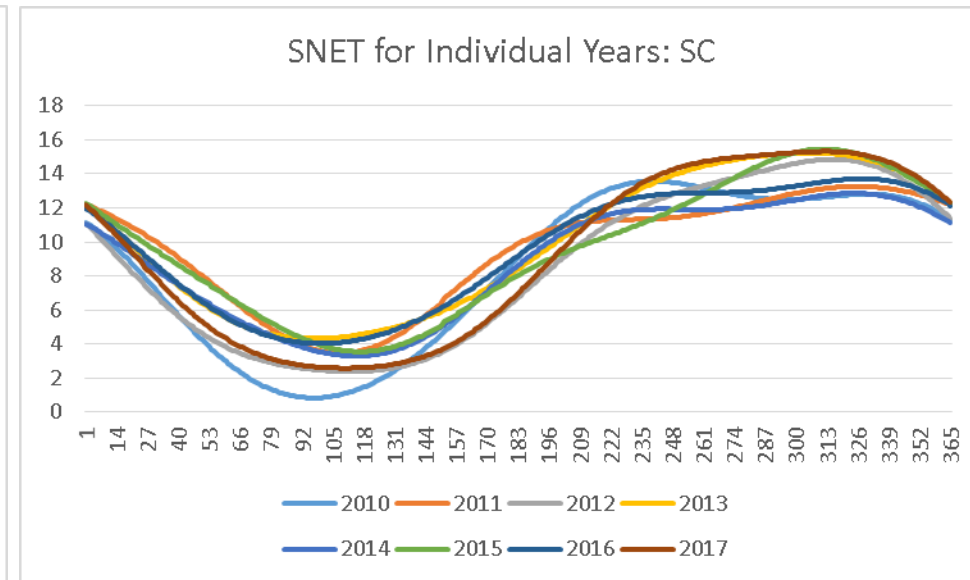
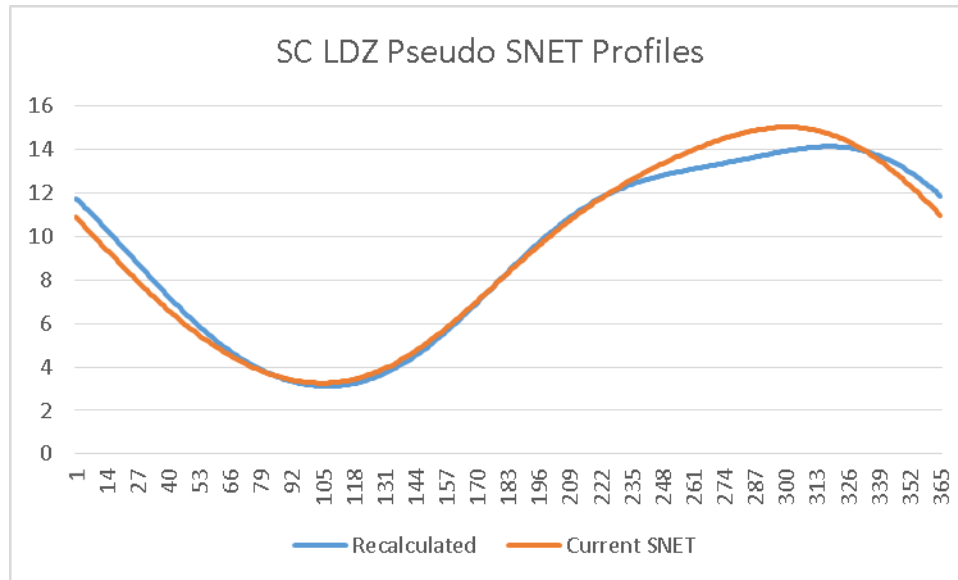
2020

Fixed Wind Speed

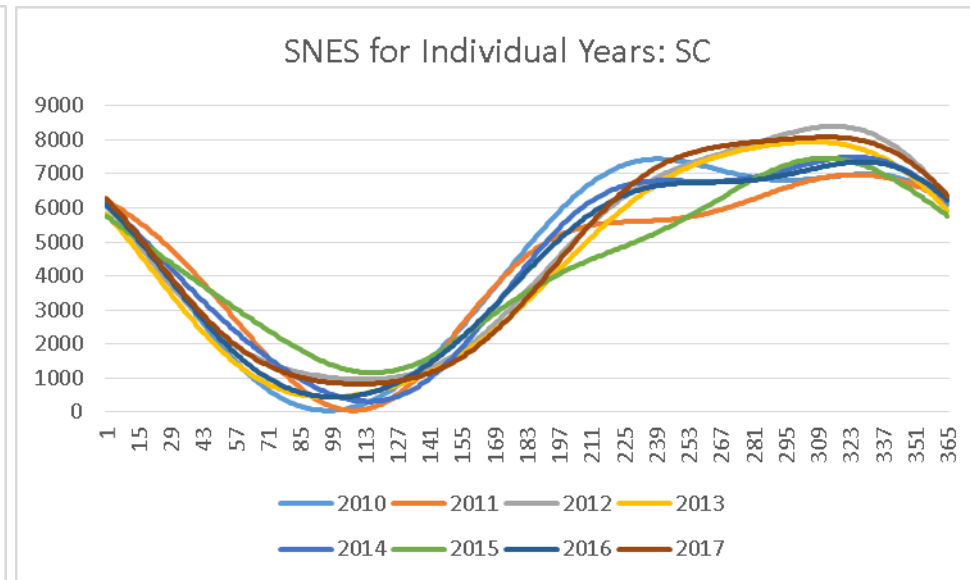
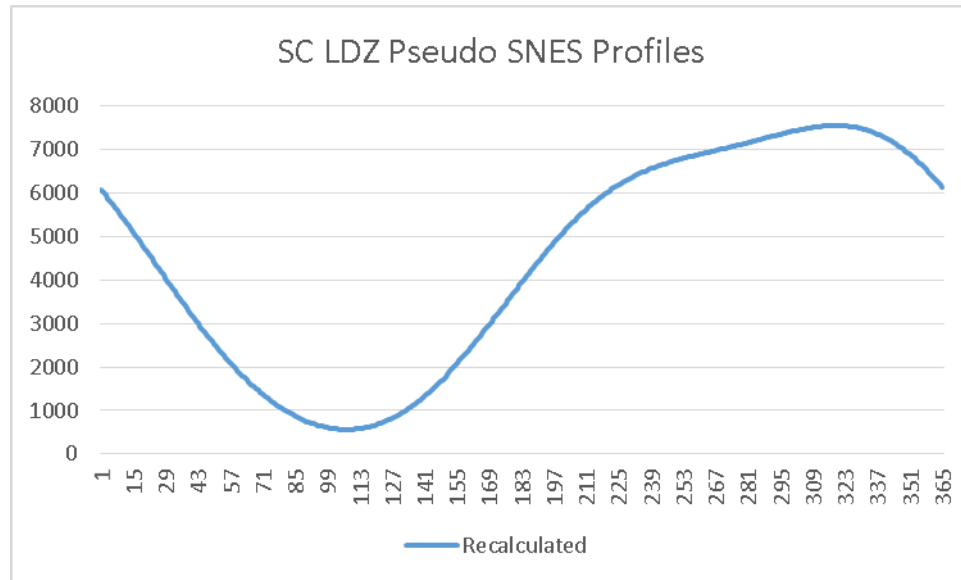
4.00



SNET



SNES



Results: LDZ SE

Parameter	2015	2020
Effective Temperature/AT Weight	0.5	0.4843
Effective Temperature Weight (I1)	0.712	0.772
Wind Chill Weight (I2)	0.014	0.006
Cold Weather Sensitivity (I3)	0.330	0.266
Cold Weather Upturn Threshold (V0)	3.000	1.335
Lower Warm Weather Cut-Off (V1)	15.100	13.996
Upper Warm Weather Cut-Off (V2)	18.700	18.523
Slope Relating to Warm Weather Cut-Off (q)	0.380	0.375
Wind Chill Wind Cut-Off (W0)	0.000	-0.721
Wind Chill Temperature Cut-Off (T0)	14.000	21.613
Solar Radiance Effect (S0)		0.566
R2	0.9915	0.9929

2020 CWV+

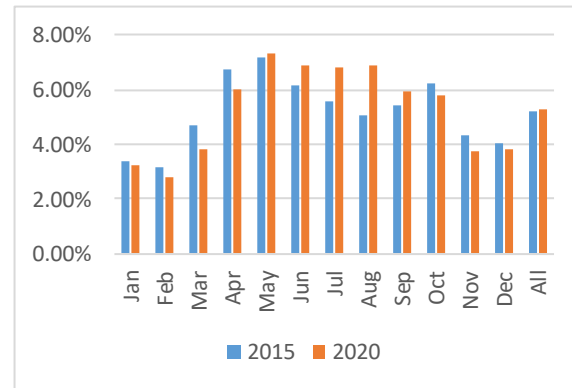
LDZ	Station
SE	Heathrow

Gas Years	2010/11 to 2017/18
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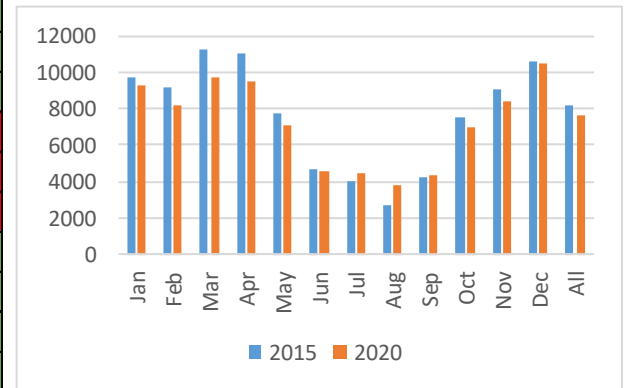
Parameters	Avg. Mean Abs. %Error
2015	5.17%
2020	5.27%

Avg. Adj. R-Sq.	Avg. RMSE (MWhs)	Avg. %diff. in est 1 in20 peak demand
0.9915	8184	
0.9929	7584	

MAPE							
Month	2015	2020	Season				
			Year	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
Jan	3.39%	3.20%	2015	3.54%	6.17%	5.62%	5.33%
Feb	3.17%	2.78%	2020	3.29%	5.71%	6.88%	5.18%
Mar	4.66%	3.84%					
Apr	6.71%	5.99%					
May	7.16%	7.32%					
Jun	6.18%	6.91%					
Jul	5.58%	6.78%					
Aug	5.04%	6.86%					
Sep	5.43%	5.96%					
Oct	6.19%	5.77%					
Nov	4.34%	3.78%					
Dec	4.02%	3.84%					
All	5.17%	5.27%					



RMSE							
Month	2015	2020	Season				
			Year	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
Jan	9724	9245	2015	10034	10135	3888	6767
Feb	9204	8198	2020	9473	8829	4296	6798
Mar	11262	9683					
Apr	11040	9497					
May	7750	7092					
Jun	4680	4594					
Jul	4021	4468					
Aug	2738	3794					
Sep	4238	4384					
Oct	7559	6939					
Nov	9099	8438					
Dec	10638	10454					
All	8184	7584					



2020 CWV+ variance v CWV benchmark

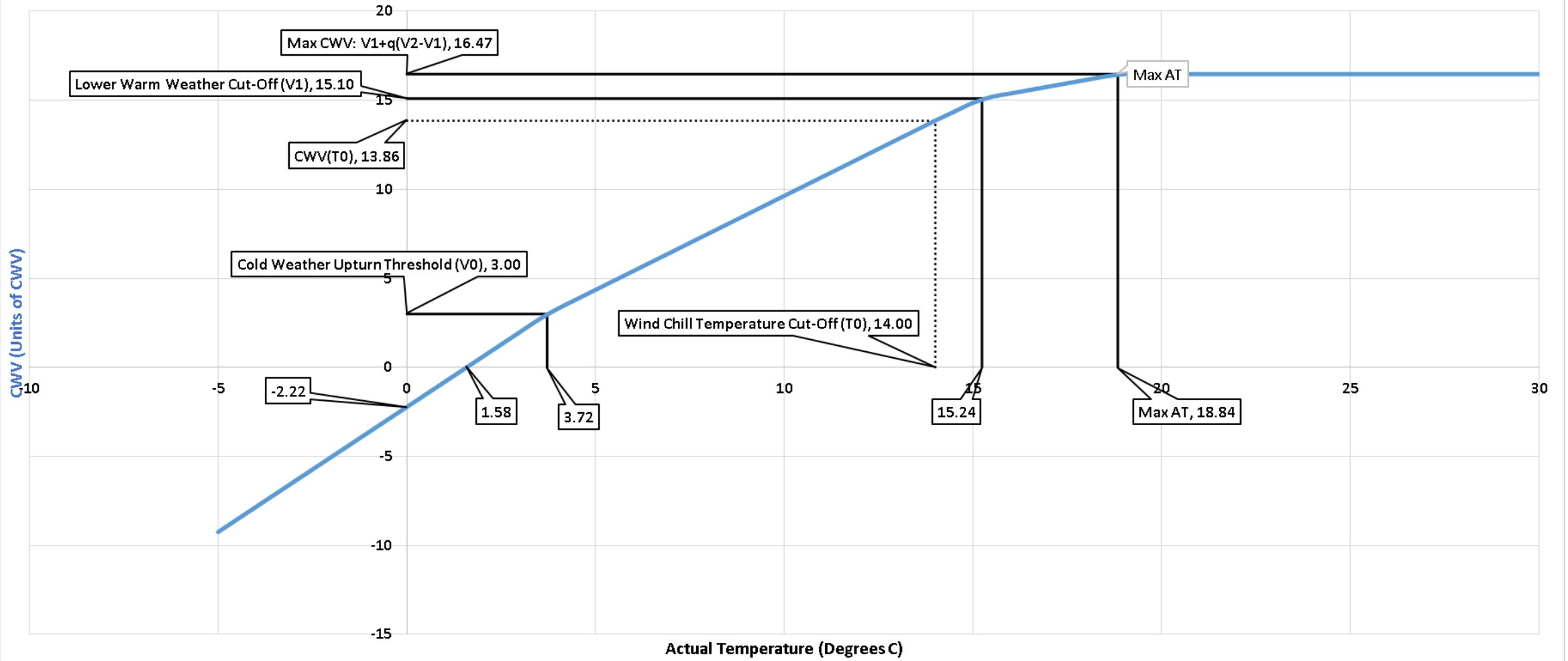
MAPE Variance from 2015 Parameters: SE

	2010	2011	2012	2013	2014	2015	2016	2017	All Years
Jan	0.35%	-0.37%	-0.89%	-0.03%	-0.07%	-0.41%	-0.19%	0.11%	-0.19%
Feb	-0.18%	-0.69%	-0.51%	-0.72%	-0.24%	0.00%	-0.68%	-0.15%	-0.40%
Mar	-0.67%	-0.74%	-1.04%	-0.92%	-1.18%	-0.40%	-1.09%	-0.49%	-0.82%
Apr	-0.09%	-0.96%	-0.44%	-1.35%	0.02%	-0.71%	-2.45%	0.22%	-0.72%
May	1.06%	0.17%	-0.03%	-0.11%	-0.38%	-0.47%	-0.30%	1.31%	0.16%
Jun	1.24%	-1.44%	-1.65%	2.33%	0.79%	1.32%	2.12%	1.11%	0.73%
Jul	2.27%	1.68%	0.02%	0.00%	2.11%	1.23%	1.73%	0.66%	1.21%
Aug	3.45%	1.51%	0.72%	3.10%	1.52%	0.50%	1.36%	2.37%	1.81%
Sep	0.49%	2.46%	-0.07%	0.36%	-0.52%	1.59%	-2.06%	1.96%	0.53%
Oct	0.50%	-1.29%	-0.46%	0.82%	-1.31%	-0.39%	-1.38%	0.16%	-0.42%
Nov	0.84%	-1.73%	-0.57%	-0.76%	-1.23%	-0.28%	0.00%	-0.73%	-0.56%
Dec	0.11%	-0.40%	-0.14%	-0.28%	-0.33%	-0.23%	-0.13%	-0.03%	-0.18%
All Months	0.78%	-0.15%	-0.42%	0.20%	-0.07%	0.15%	-0.26%	0.54%	0.10%

2015

Fixed Wind Speed

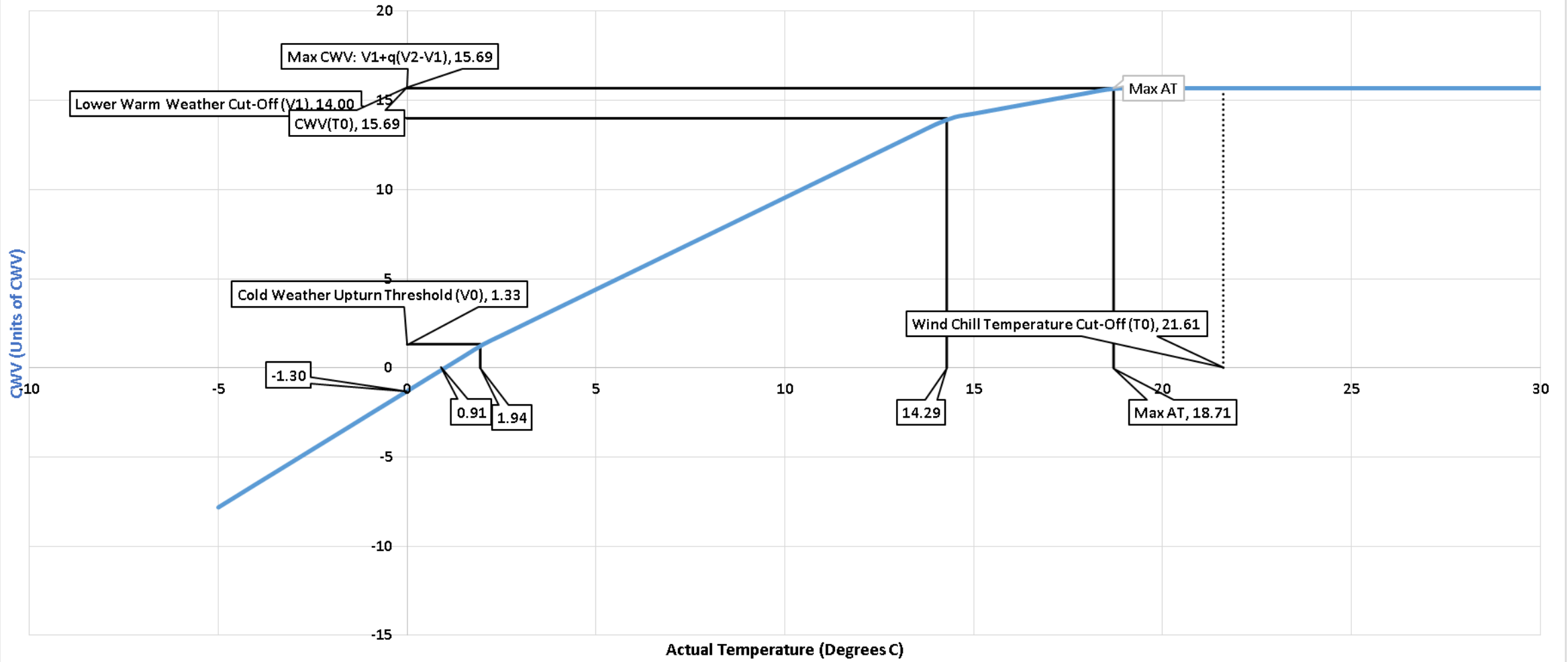
4.00



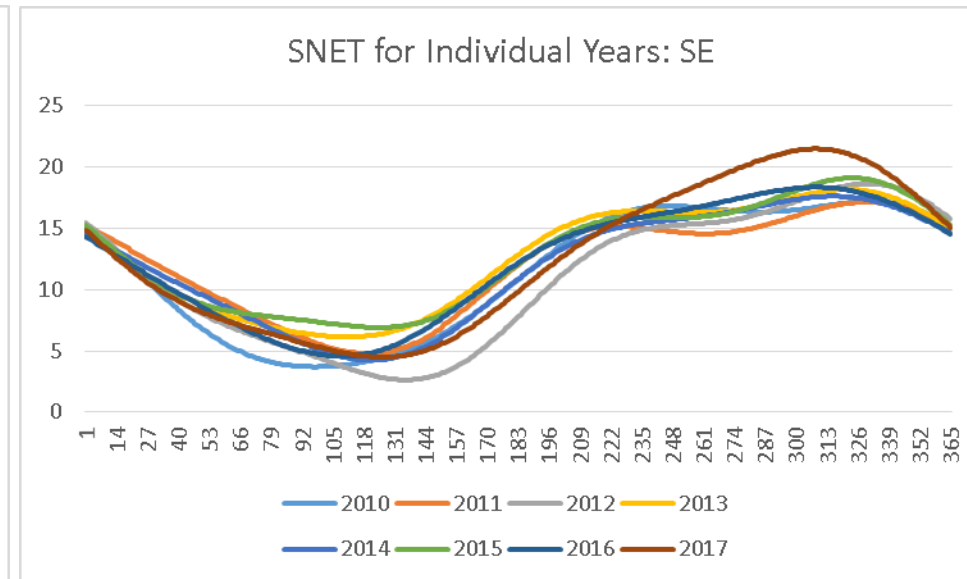
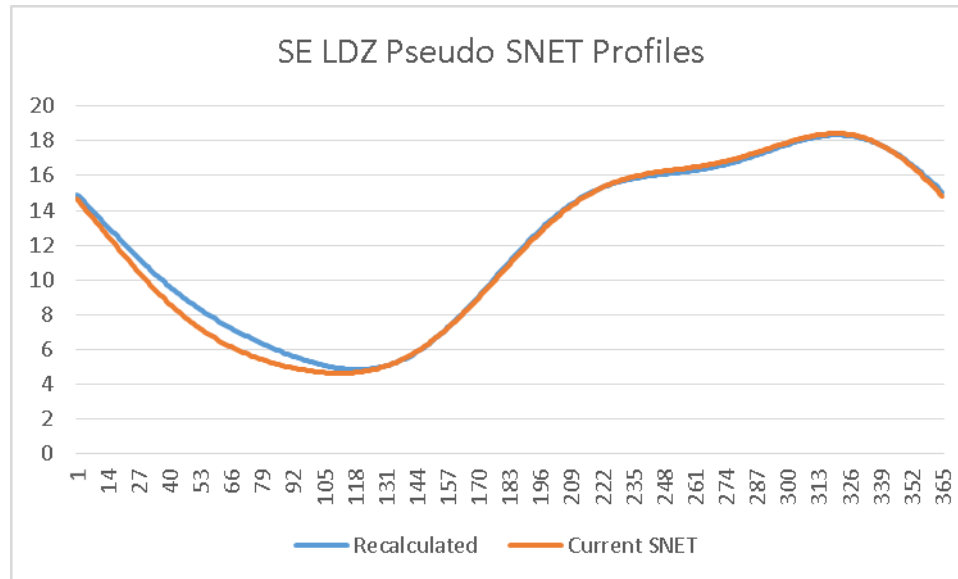
2020

Fixed Wind Speed

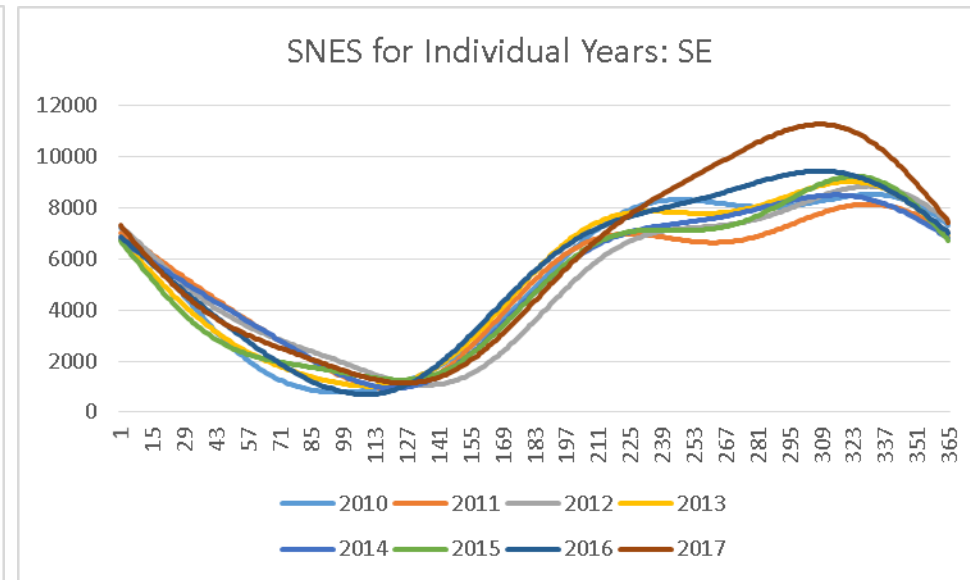
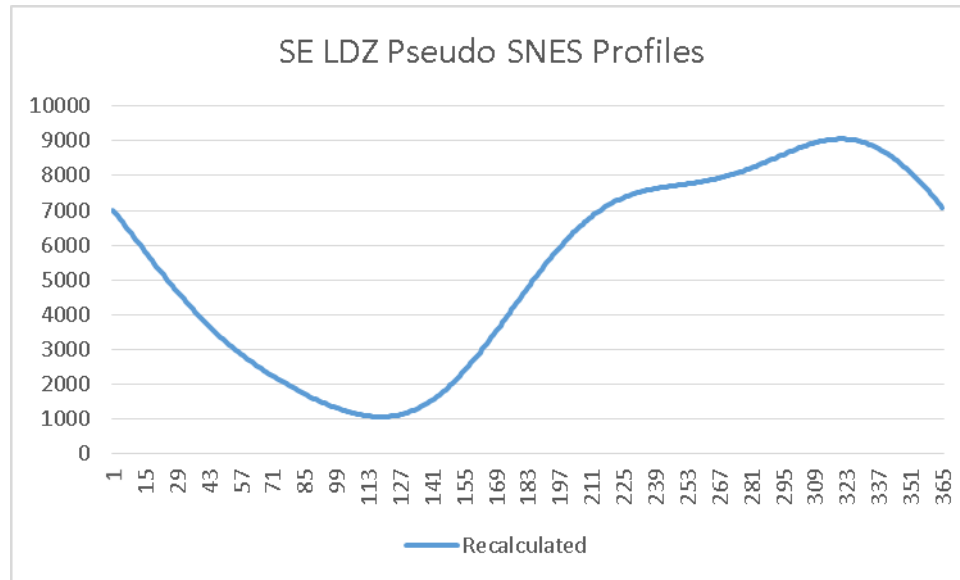
4.00



SNET



SNES



Results: LDZ SO

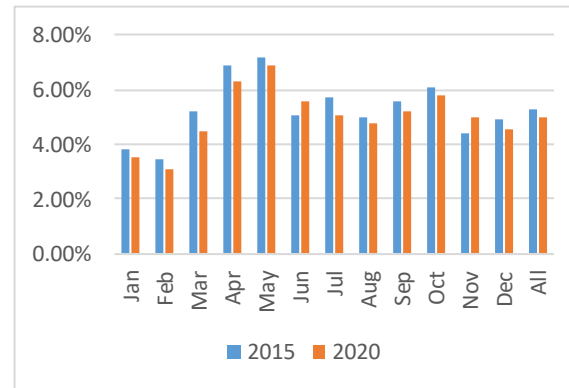
Parameter	2015	2020
Effective Temperature/AT Weight	0.5	0.4381
Effective Temperature Weight (I1)	0.720	0.692
Wind Chill Weight (I2)	0.013	0.015
Cold Weather Sensitivity (I3)	0.240	0.405
Cold Weather Upturn Threshold (V0)	3.000	0.141
Lower Warm Weather Cut-Off (V1)	14.800	14.745
Upper Warm Weather Cut-Off (V2)	18.200	18.715
Slope Relating to Warm Weather Cut-Off (q)	0.370	0.345
Wind Chill Wind Cut-Off (W0)	0.000	-2.076
Wind Chill Temperature Cut-Off (T0)	14.000	11.978
Solar Radiance Effect (S0)		0.559
R2	0.9918	0.9934

2020 CWV+

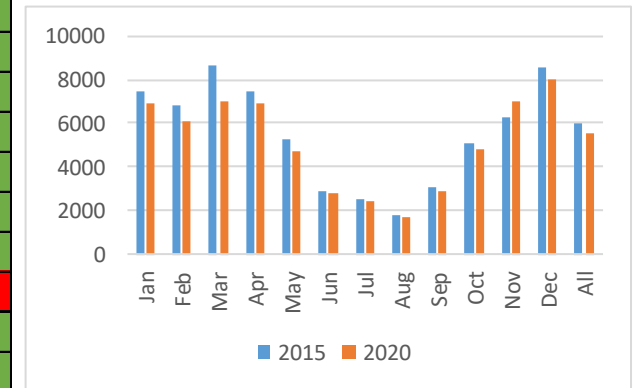
LDZ	Station	Gas Years	2010/11 to 2017/18
SO	Southampton Oceanographic Ce		

Parameters	Avg. Mean Abs. %Error	Avg. Adj. R-Sq.	Avg. RMSE (MWhs)	Avg. %diff. in est 1 in20 peak demand
2015	5.28%	0.9918	5956	
2020	5.02%	0.9934	5508	

		MAPE					
Month	2015	2020	Season				
			Year	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
Jan	3.83%	3.54%	2015	4.07%	6.40%	5.26%	5.37%
Feb	3.42%	3.08%	2020	3.73%	5.88%	5.12%	5.32%
Mar	5.20%	4.45%					
Apr	6.85%	6.33%					
May	7.17%	6.86%					
Jun	5.06%	5.54%					
Jul	5.74%	5.09%					
Aug	4.96%	4.73%					
Sep	5.60%	5.21%					
Oct	6.08%	5.75%					
Nov	4.41%	4.98%					
Dec	4.91%	4.52%					
All	5.28%	5.02%					



		RMSE					
Month	2015	2020	Season				
			Year	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
Jan	7452	6893	2015	7733	7247	2436	5186
Feb	6858	6043	2020	7079	6315	2323	5158
Mar	8618	7006					
Apr	7482	6944					
May	5236	4755					
Jun	2864	2760					
Jul	2553	2406					
Aug	1777	1689					
Sep	3031	2878					
Oct	5087	4801					
Nov	6235	6971					
Dec	8587	8014					
All	5956	5508					



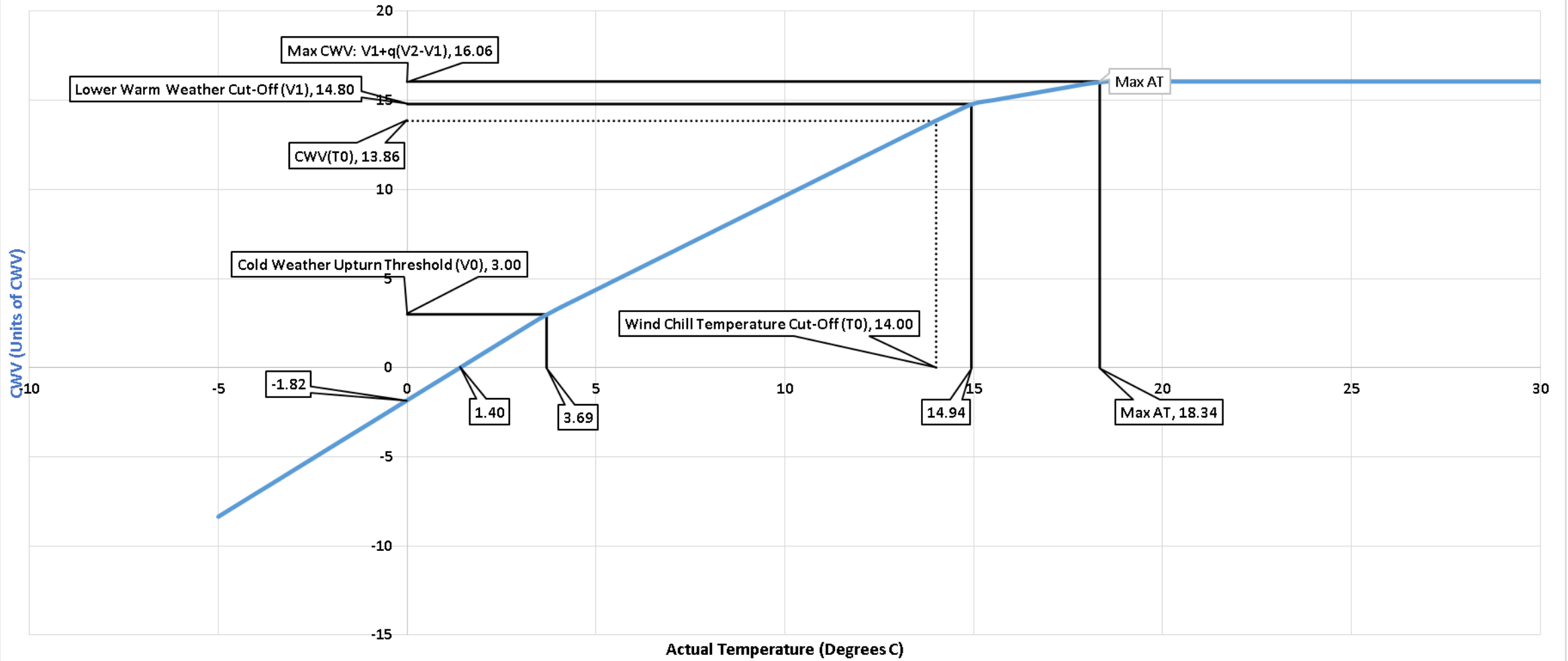
2020 CWV+ variance v CWV benchmark

MAPE Variance from 2015 Parameters: SO

	2010	2011	2012	2013	2014	2015	2016	2017	All Years
Jan	-0.68%	-0.54%	-0.27%	-0.09%	-0.34%	0.22%	-0.26%	-0.37%	-0.29%
Feb	-0.45%	-0.09%	-0.62%	-0.29%	-0.42%	-0.24%	-0.61%	-0.04%	-0.34%
Mar	-0.45%	-1.15%	-1.32%	-0.80%	-0.55%	-0.10%	-0.16%	-1.43%	-0.74%
Apr	-0.06%	0.46%	0.12%	-0.97%	-0.90%	-1.11%	-1.22%	-0.53%	-0.53%
May	0.15%	0.30%	-1.60%	0.09%	-0.21%	-0.72%	0.15%	-0.63%	-0.31%
Jun	-0.44%	-0.34%	-0.46%	0.72%	1.11%	0.55%	0.64%	2.00%	0.47%
Jul	0.32%	-0.07%	-2.04%	-0.35%	-0.25%	-0.41%	-0.85%	-1.57%	-0.65%
Aug	0.78%	0.46%	0.46%	0.82%	-2.00%	-0.58%	-1.32%	-0.48%	-0.23%
Sep	-0.87%	0.35%	-1.00%	-0.66%	0.27%	0.81%	-1.19%	-0.78%	-0.38%
Oct	0.82%	-1.12%	0.10%	0.36%	0.35%	-0.93%	-1.14%	-1.02%	-0.33%
Nov	1.20%	3.51%	-0.39%	-0.05%	-0.38%	0.90%	-0.11%	-0.17%	0.56%
Dec	-0.20%	-0.75%	-1.31%	0.30%	0.00%	0.16%	-0.54%	-0.80%	-0.39%
All Months	0.01%	0.09%	-0.69%	-0.08%	-0.28%	-0.12%	-0.55%	-0.48%	-0.26%

2015

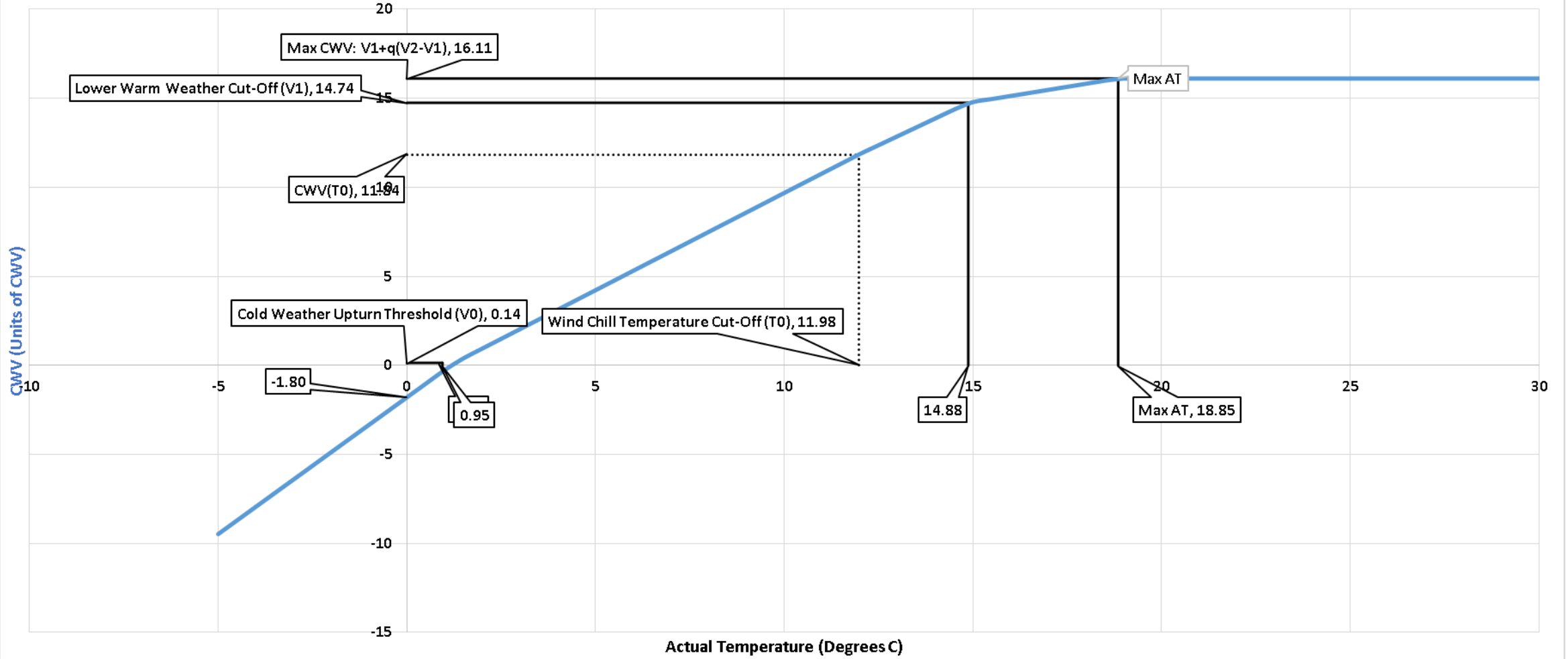
Fixed Wind Speed



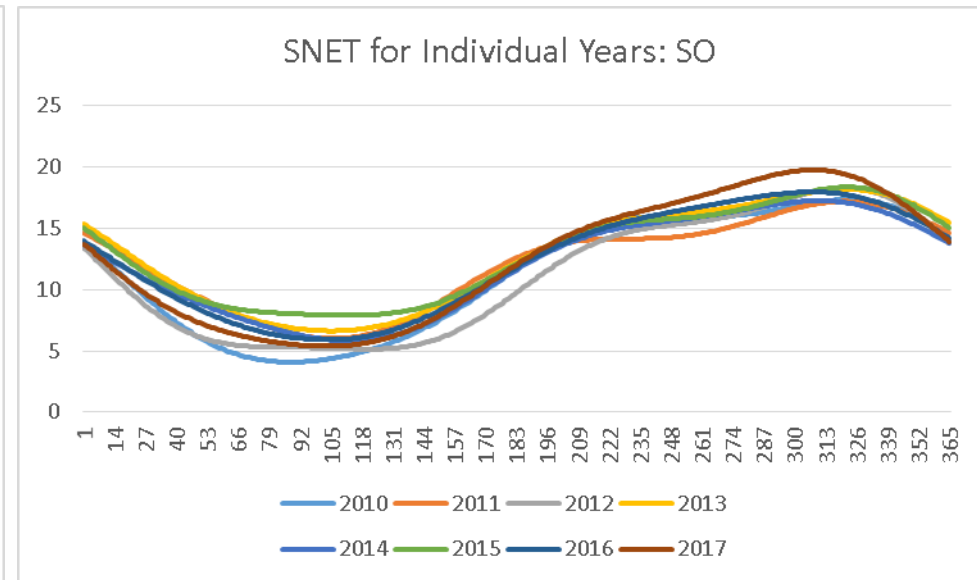
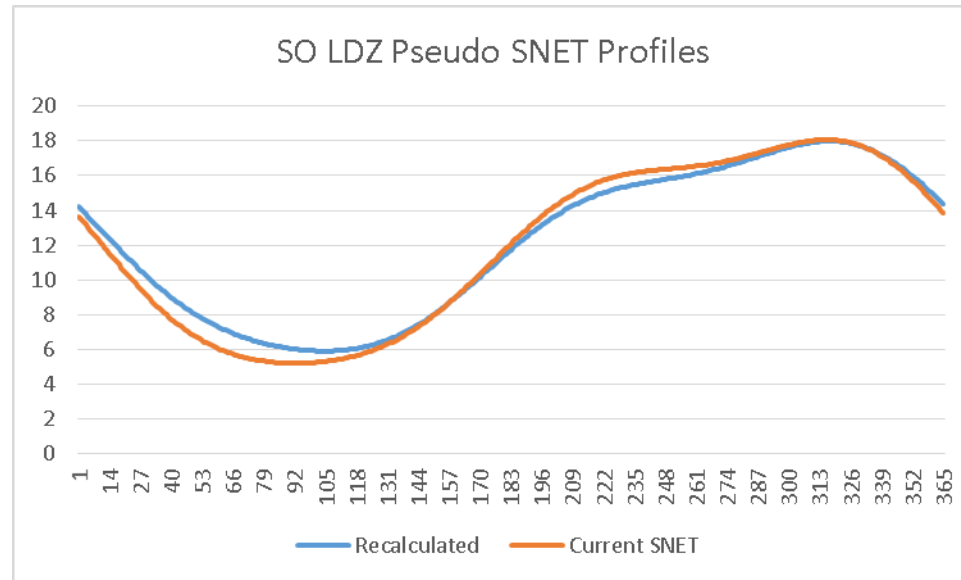
2020

Fixed Wind Speed

4.00



SNET



Results: LDZ SW

Parameter	2015	2020
Effective Temperature/AT Weight	0.5	0.4482
Effective Temperature Weight (I1)	0.682	0.623
Wind Chill Weight (I2)	0.010	0.008
Cold Weather Sensitivity (I3)	0.220	0.258
Cold Weather Upturn Threshold (V0)	3.000	3.476
Lower Warm Weather Cut-Off (V1)	14.200	13.254
Upper Warm Weather Cut-Off (V2)	17.300	17.898
Slope Relating to Warm Weather Cut-Off (q)	0.420	0.337
Wind Chill Wind Cut-Off (W0)	0.000	0.705
Wind Chill Temperature Cut-Off (T0)	14.000	21.707
Solar Radiance Effect (S0)		0.801
R2	0.9904	0.9908

2020 CWV+

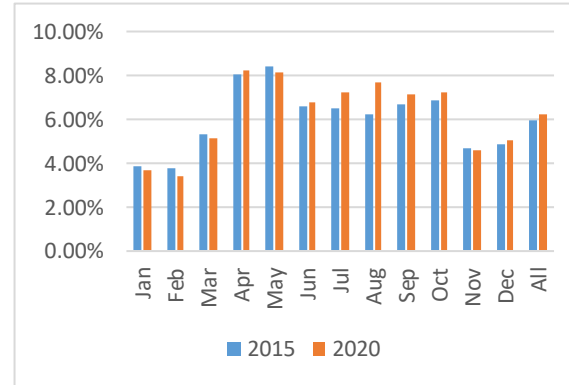
LDZ	Station
SW	Yeolvilton

Gas Years	2010/11 to 2017/18
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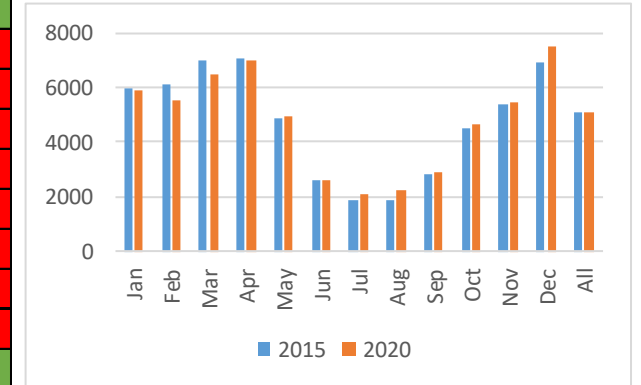
Parameters	Avg. Mean Abs. %Error
2015	5.99%
2020	6.21%

Avg. Adj. R-Sq.	Avg. RMSE (MWhs)	Avg. %diff. in est 1 in20 peak demand
0.9904	5125	
0.9908	5101	

MAPE							
Month	2015	2020	Season				
			Year	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
Jan	3.82%	3.69%	2015	4.16%	7.23%	6.44%	6.11%
Feb	3.76%	3.42%	2020	4.06%	7.19%	7.24%	6.32%
Mar	5.29%	5.18%					
Apr	8.02%	8.26%					
May	8.40%	8.16%					
Jun	6.58%	6.82%					
Jul	6.48%	7.21%					
Aug	6.26%	7.67%					
Sep	6.70%	7.17%					
Oct	6.88%	7.20%					
Nov	4.71%	4.55%					
Dec	4.87%	5.00%					
All	5.99%	6.21%					



RMSE							
Month	2015	2020	Season				
			Year	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
Jan	5971	5880	2015	6410	6391	2150	4462
Feb	6131	5496	2020	6379	6194	2315	4481
Mar	7025	6460					
Apr	7060	6998					
May	4862	4973					
Jun	2599	2603					
Jul	1910	2071					
Aug	1879	2251					
Sep	2802	2893					
Oct	4538	4679					
Nov	5399	5470					
Dec	6947	7472					
All	5125	5101					



2020 CWV+ variance v CWV benchmark

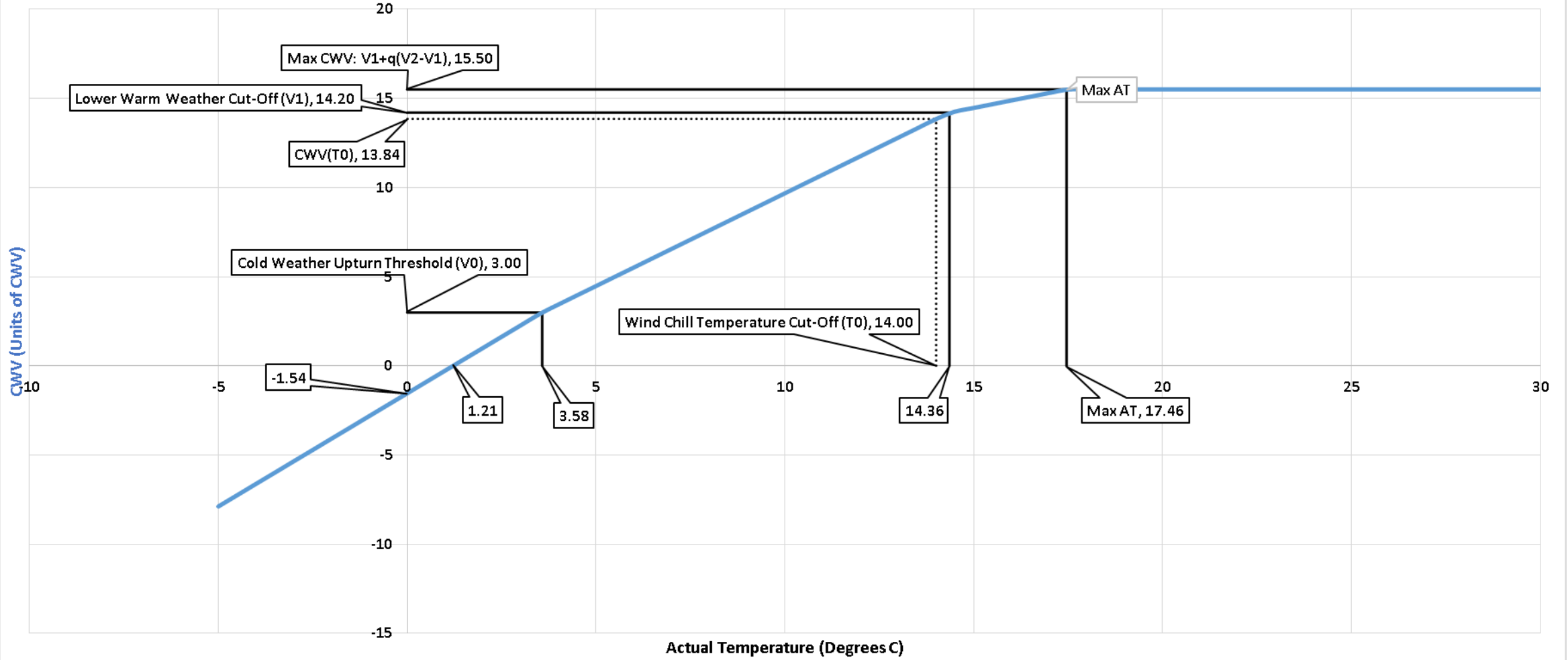
MAPE Variance from 2015 Parameters: SW

	2010	2011	2012	2013	2014	2015	2016	2017	All Years
Jan	-0.71%	0.19%	0.62%	-0.19%	0.70%	-0.71%	-0.28%	-0.65%	-0.13%
Feb	0.19%	-1.37%	-0.24%	-1.04%	-0.54%	0.58%	-0.07%	-0.25%	-0.34%
Mar	-0.24%	2.38%	-0.73%	-0.68%	0.11%	-0.61%	-0.71%	-0.43%	-0.11%
Apr	1.01%	-0.52%	-1.24%	-0.01%	0.50%	-0.04%	2.25%	-0.02%	0.24%
May	-0.67%	0.41%	-1.16%	1.60%	1.45%	-2.41%	-1.39%	0.29%	-0.23%
Jun	-2.02%	-1.91%	-0.30%	-0.56%	2.18%	0.97%	1.38%	2.16%	0.24%
Jul	0.31%	1.64%	2.57%	0.57%	1.57%	1.67%	1.17%	-3.65%	0.73%
Aug	2.43%	1.07%	2.60%	1.40%	-1.88%	2.44%	0.52%	2.70%	1.41%
Sep	-0.55%	0.02%	-0.58%	1.46%	0.61%	2.49%	0.35%	-0.07%	0.47%
Oct	0.94%	-0.77%	1.20%	1.88%	1.94%	-1.83%	-0.53%	-0.30%	0.32%
Nov	1.06%	-2.26%	-0.54%	-0.70%	-2.38%	0.49%	1.69%	1.37%	-0.16%
Dec	-0.09%	-0.08%	-0.63%	-0.26%	1.19%	1.20%	-0.22%	-0.05%	0.13%
All Months	0.14%	-0.10%	0.13%	0.29%	0.45%	0.35%	0.35%	0.09%	0.21%

2015

Fixed Wind Speed

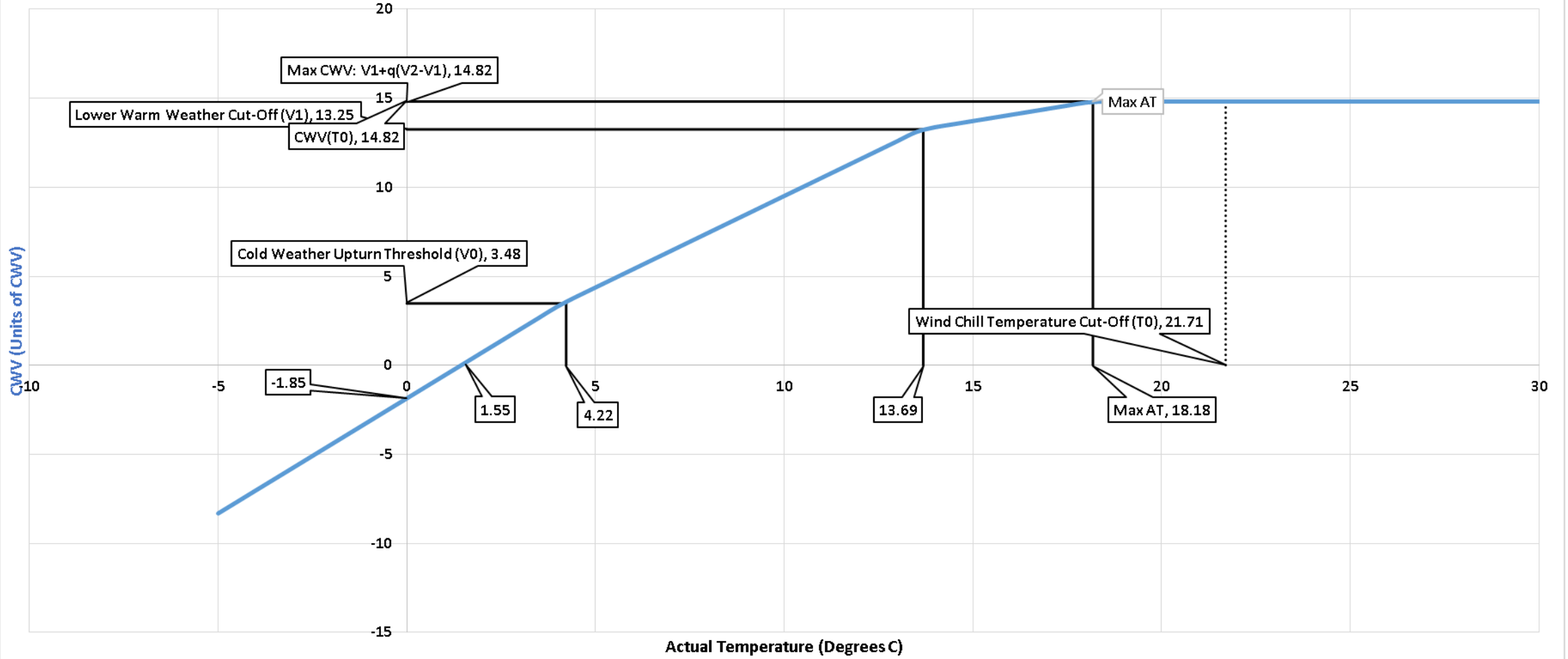
4.00



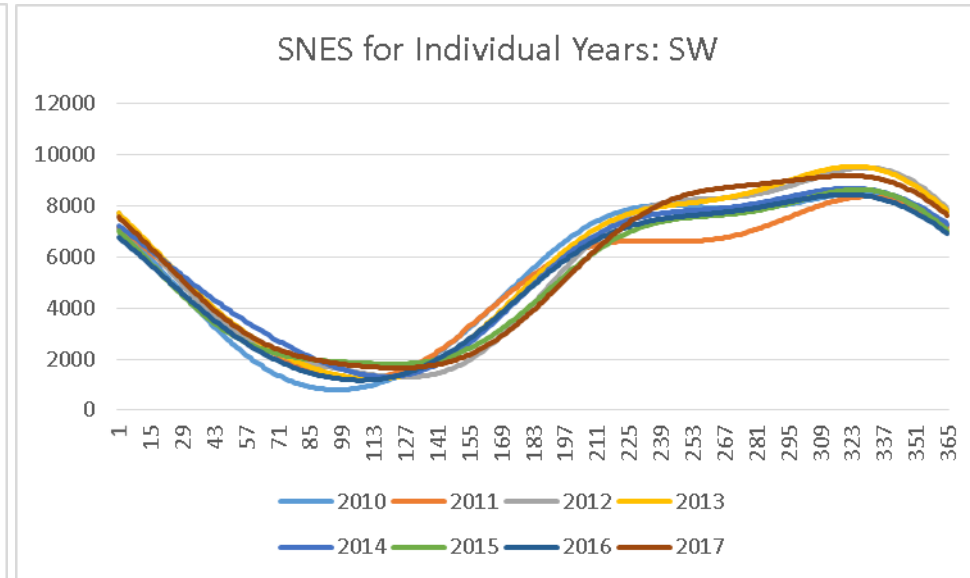
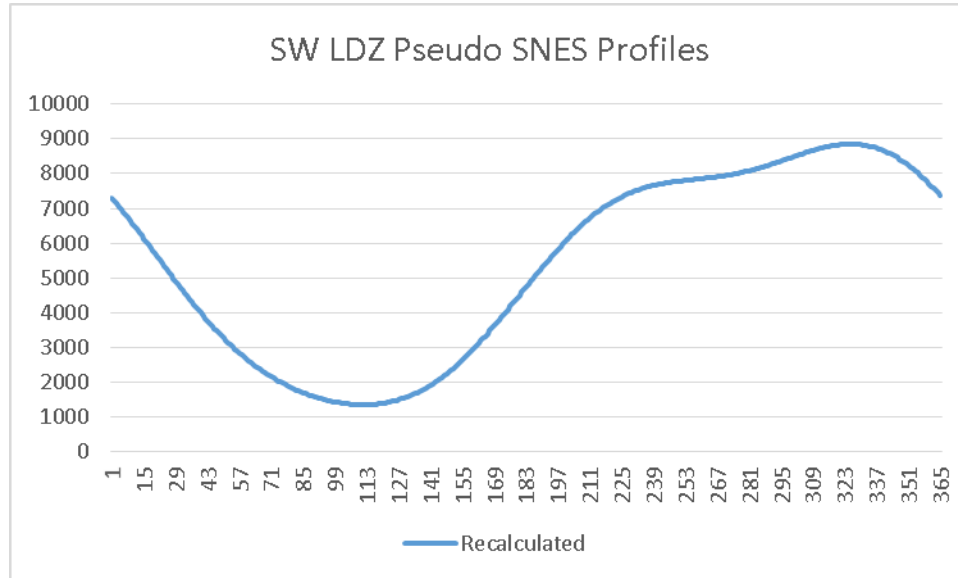
2020

Fixed Wind Speed

4.00



SNES



Results: LDZ WM

Parameter	2015	2020
Effective Temperature/AT Weight	0.5	0.4709
Effective Temperature Weight (I1)	0.720	0.692
Wind Chill Weight (I2)	0.011	0.010
Cold Weather Sensitivity (I3)	0.140	0.163
Cold Weather Upturn Threshold (V0)	3.000	4.385
Lower Warm Weather Cut-Off (V1)	13.700	13.392
Upper Warm Weather Cut-Off (V2)	17.200	17.480
Slope Relating to Warm Weather Cut-Off (q)	0.430	0.368
Wind Chill Wind Cut-Off (W0)	0.000	-3.619
Wind Chill Temperature Cut-Off (T0)	14.000	17.569
Solar Radiance Effect (S0)		0.678
R2	0.9921	0.9940

2020 CWV+

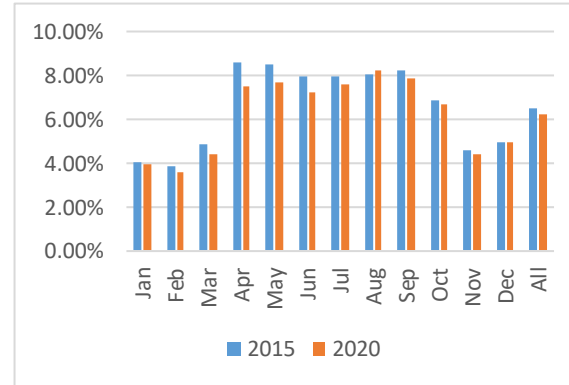
LDZ	Station
WM	Winterbourne

Gas Years	2010/11 to 2017/18
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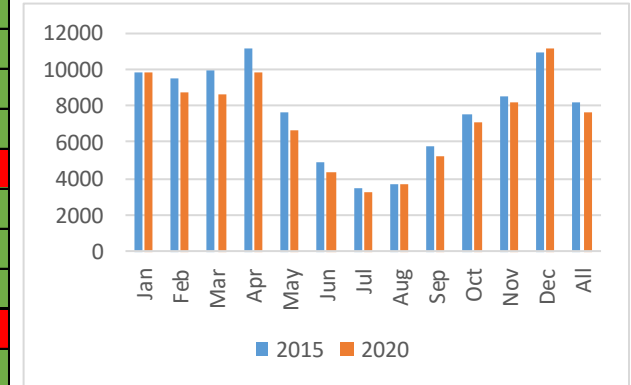
Parameters	Avg. Mean Abs. %Error
2015	6.55%
2020	6.18%

Avg. Adj. R-Sq.	Avg. RMSE (MWhs)	Avg. %diff. in est 1 in20 peak demand
0.9921	8155	
0.9940	7626	

MAPE							
Month	2015	2020	Season				
			Year	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
Jan	4.01%	3.93%	2015	4.30%	7.29%	7.98%	6.56%
Feb	3.90%	3.56%	2020	4.18%	6.54%	7.68%	6.29%
Mar	4.88%	4.45%					
Apr	8.57%	7.51%					
May	8.48%	7.70%					
Jun	7.95%	7.20%					
Jul	7.96%	7.59%					
Aug	8.02%	8.25%					
Sep	8.24%	7.84%					
Oct	6.86%	6.65%					
Nov	4.57%	4.38%					
Dec	4.96%	4.98%					
All	6.55%	6.18%					



RMSE							
Month	2015	2020	Season				
			Year	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
Jan	9870	9791	2015	10198	9647	4024	7065
Feb	9533	8746	2020	10019	8435	3786	6930
Mar	9882	8636					
Apr	11130	9778					
May	7659	6638					
Jun	4861	4308					
Jul	3452	3301					
Aug	3642	3698					
Sep	5746	5224					
Oct	7556	7086					
Nov	8514	8155					
Dec	10956	11181					
All	8155	7626					



2020 CWV+ variance v CWV benchmark

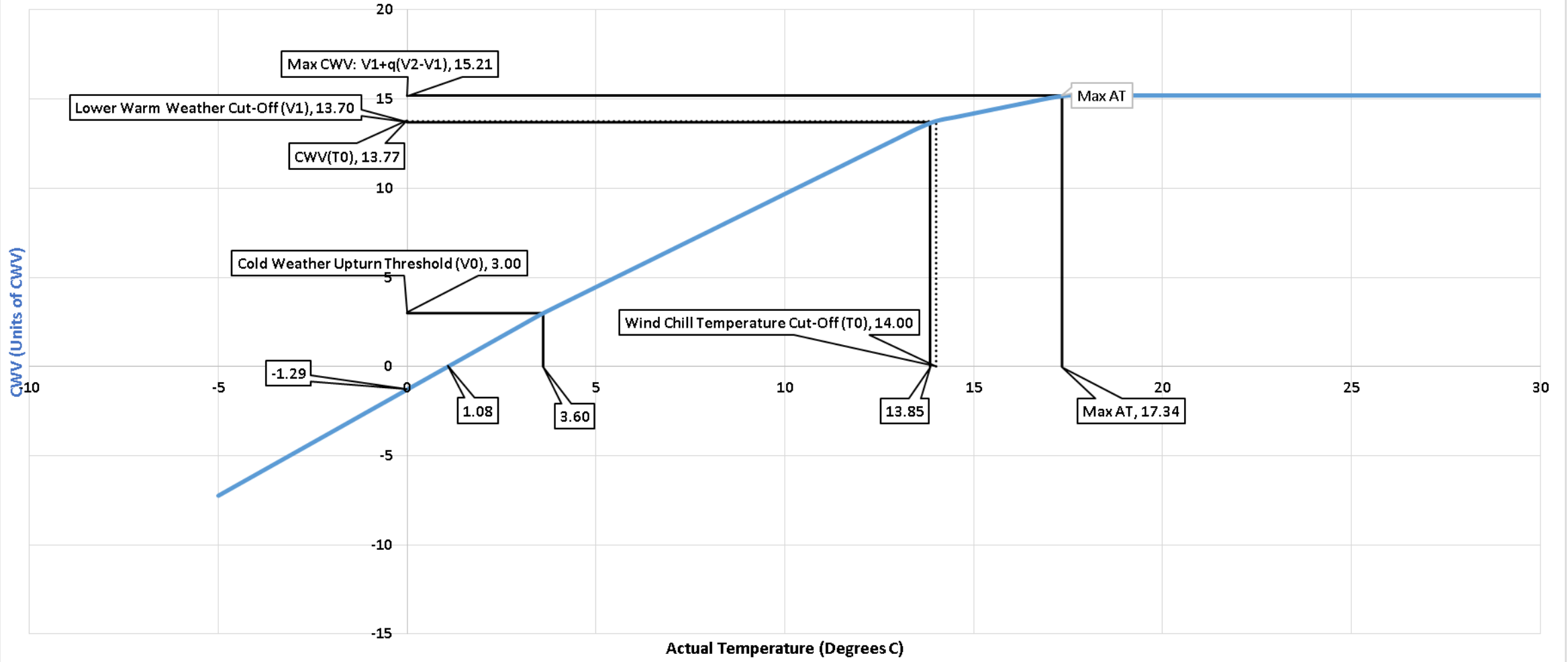
MAPE Variance from 2015 Parameters: WM

	2010	2011	2012	2013	2014	2015	2016	2017	All Years
Jan	0.16%	0.01%	-0.25%	-0.07%	-0.31%	-0.14%	-0.33%	0.28%	-0.08%
Feb	0.36%	-0.35%	-0.53%	-0.94%	-0.78%	0.17%	-0.42%	-0.20%	-0.34%
Mar	-0.21%	0.03%	-0.77%	-0.48%	-0.31%	-0.31%	-0.94%	-0.47%	-0.43%
Apr	-0.30%	-1.65%	-0.26%	-1.37%	-2.30%	-0.18%	-1.45%	-0.92%	-1.06%
May	-0.19%	-0.37%	-3.11%	-1.30%	-0.15%	-0.60%	-0.48%	-0.05%	-0.78%
Jun	-0.66%	-2.04%	-1.05%	-1.07%	0.14%	-0.19%	-1.79%	0.63%	-0.75%
Jul	-0.88%	-0.67%	-0.45%	-0.34%	-1.03%	-0.55%	0.04%	0.90%	-0.37%
Aug	0.02%	-0.02%	2.26%	0.33%	-1.85%	0.81%	-0.30%	0.62%	0.23%
Sep	-0.31%	-0.10%	-0.09%	-1.13%	-1.91%	0.14%	0.97%	-0.80%	-0.40%
Oct	0.61%	-0.33%	0.23%	0.02%	0.62%	-1.71%	-1.24%	0.12%	-0.21%
Nov	0.87%	-0.82%	0.01%	0.05%	-0.80%	-0.72%	0.46%	-0.57%	-0.19%
Dec	0.81%	0.08%	-0.28%	-0.05%	-0.09%	0.42%	-0.61%	-0.12%	0.02%
All Months	0.02%	-0.52%	-0.36%	-0.53%	-0.73%	-0.24%	-0.51%	-0.05%	-0.36%

2015

Fixed Wind Speed

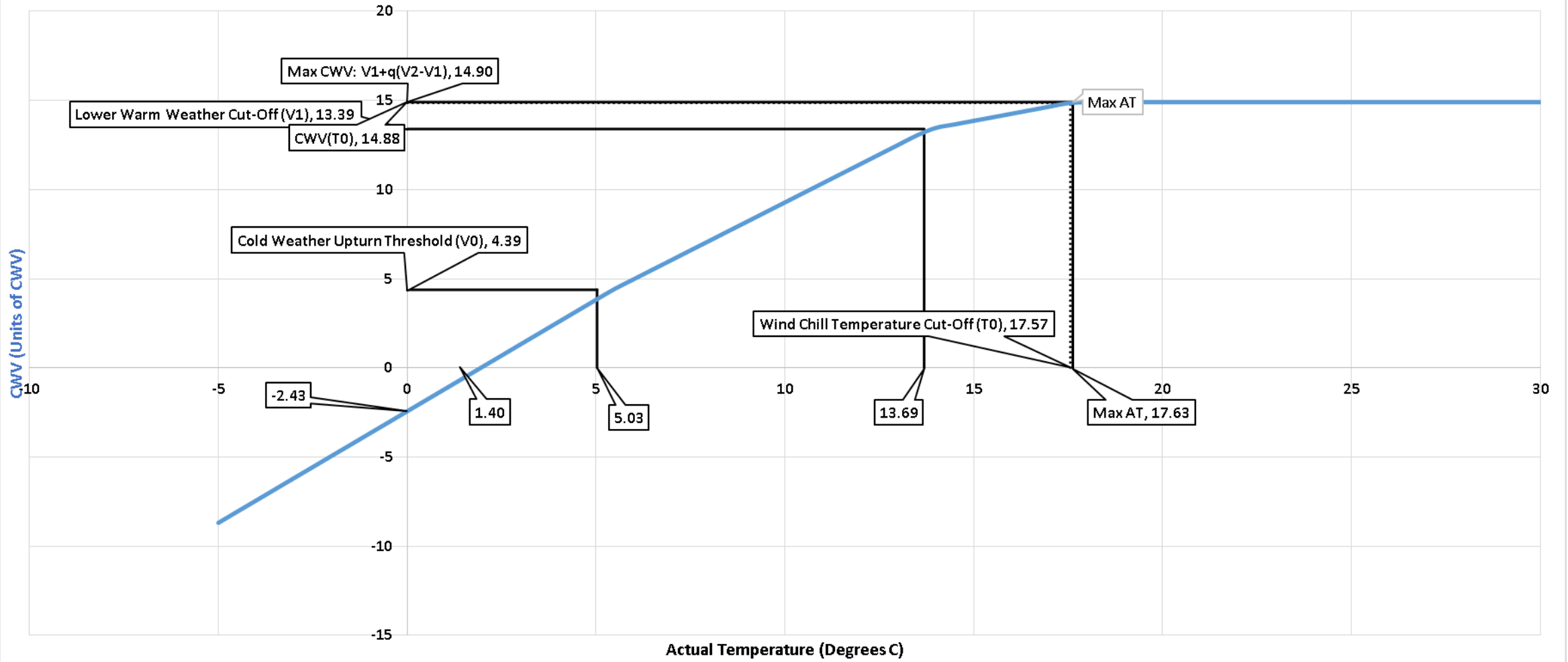
4.00



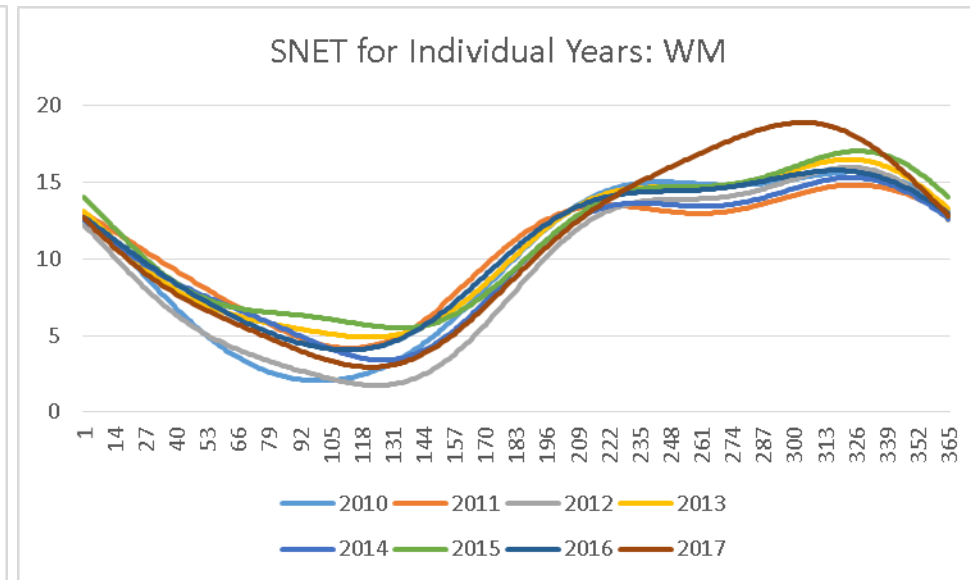
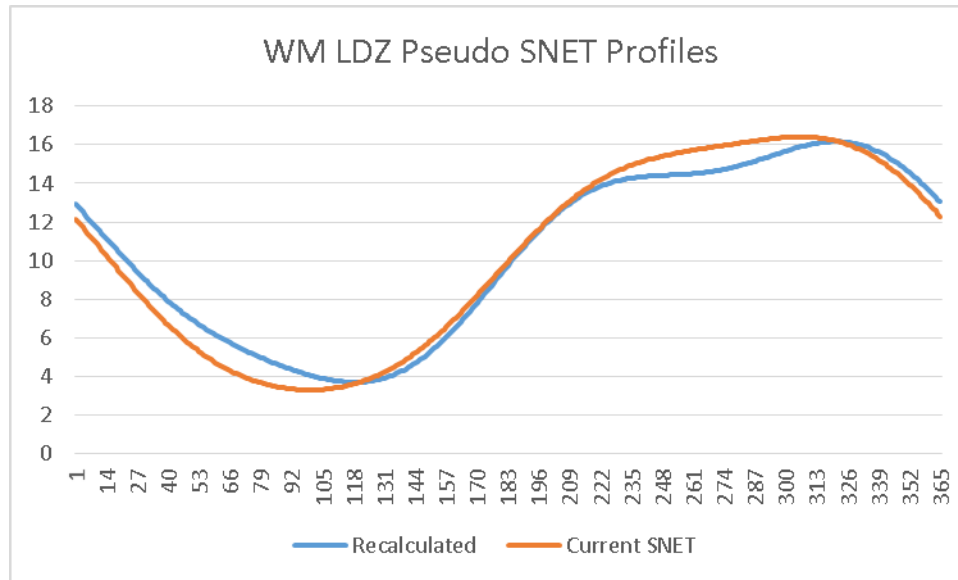
2020

Fixed Wind Speed

4.00



SNET



Results: LDZ WN

Parameter	2015	2020
Effective Temperature/AT Weight	0.5	0.4822
Effective Temperature Weight (I1)	0.697	0.618
Wind Chill Weight (I2)	0.015	0.009
Cold Weather Sensitivity (I3)	0.300	0.324
Cold Weather Upturn Threshold (V0)	3.000	3.773
Lower Warm Weather Cut-Off (V1)	14.900	13.477
Upper Warm Weather Cut-Off (V2)	18.000	16.987
Slope Relating to Warm Weather Cut-Off (q)	0.380	0.445
Wind Chill Wind Cut-Off (W0)	0.000	-3.926
Wind Chill Temperature Cut-Off (T0)	14.000	18.249
Solar Radiance Effect (S0)		0.679
R2	0.9840	0.9858

2020 CWV+

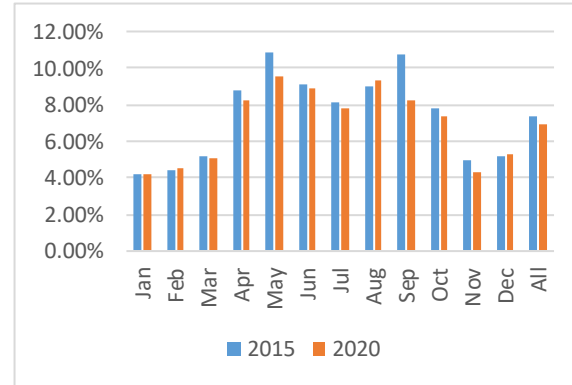
LDZ	Station
WN	Manchester Rostherne

Gas Years	2010/11 to 2017/18
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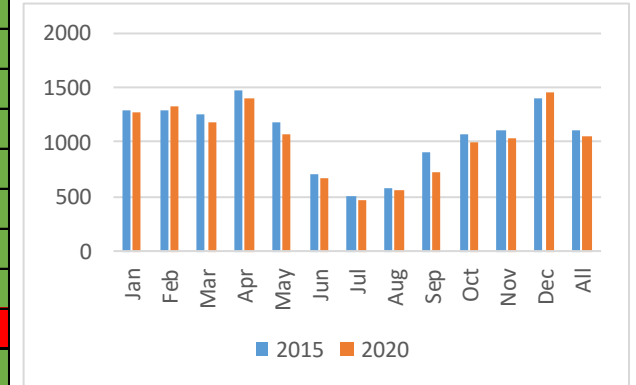
Parameters	Avg. Mean Abs. %Error
2015	7.39%
2020	6.91%

Avg. Adj. R-Sq.	Avg. RMSE (MWhs)	Avg. %diff. in est 1 in20 peak demand
0.9840	1104	
0.9859	1059	

MAPE							
Month	2015	2020	Season				
			Year	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
Jan	4.20%	4.24%	2015	4.61%	8.29%	8.75%	7.84%
Feb	4.46%	4.50%	2020	4.70%	7.61%	8.65%	6.65%
Mar	5.18%	5.03%					
Apr	8.79%	8.21%					
May	10.92%	9.60%					
Jun	9.08%	8.84%					
Jul	8.11%	7.75%					
Aug	9.06%	9.37%					
Sep	10.80%	8.22%					
Oct	7.76%	7.40%					
Nov	4.97%	4.29%					
Dec	5.15%	5.34%					
All	7.39%	6.91%					



RMSE							
Month	2015	2020	Season				
			Year	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
Jan	1289	1268	2015	1331	1305	597	978
Feb	1288	1320	2020	1353	1224	566	925
Mar	1245	1181					
Apr	1478	1401					
May	1180	1074					
Jun	707	661					
Jul	497	461					
Aug	571	562					
Sep	909	720					
Oct	1067	989					
Nov	1107	1033					
Dec	1399	1453					
All	1104	1059					



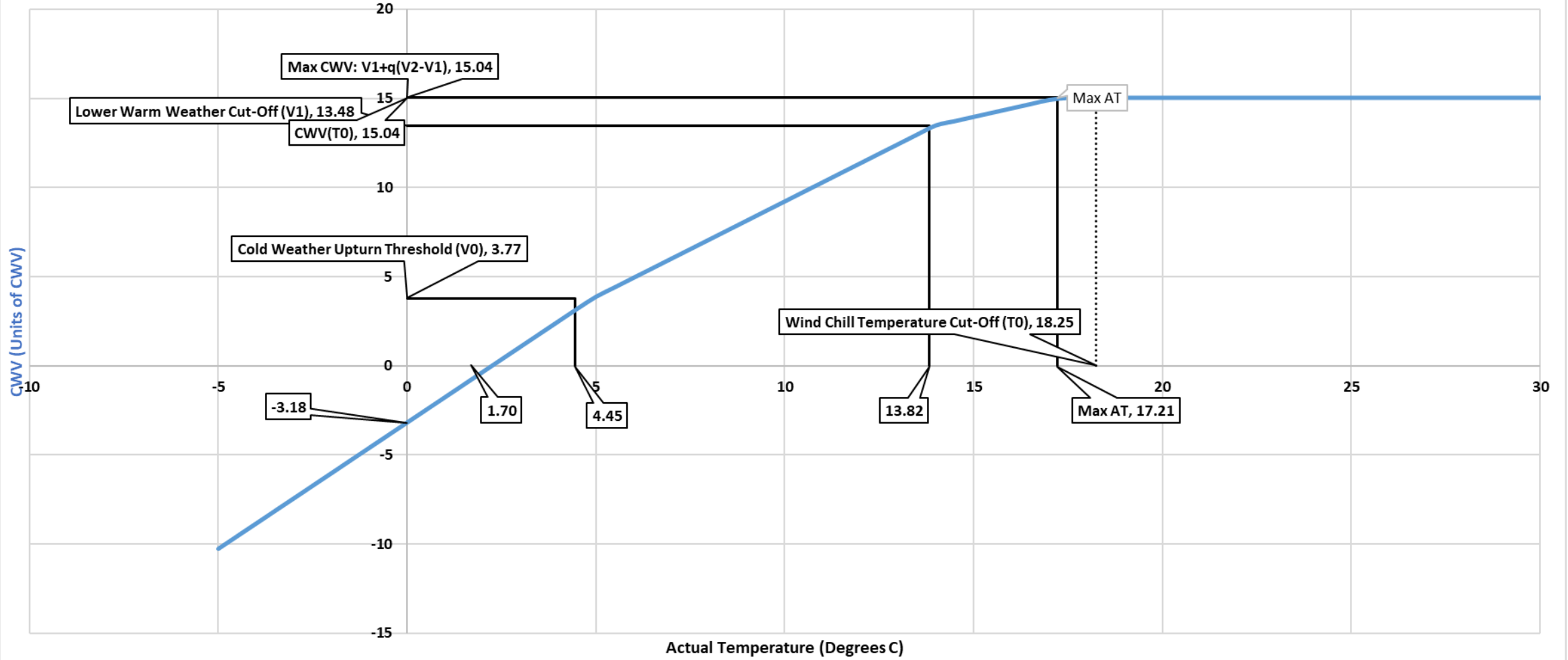
2020 CWV+ variance v CWV benchmark

MAPE Variance from 2015 Parameters: WN

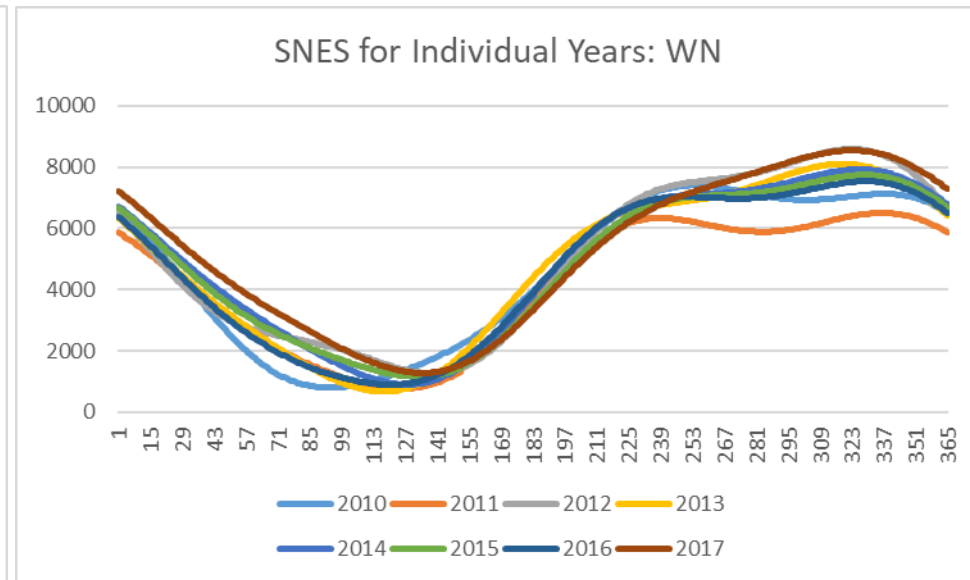
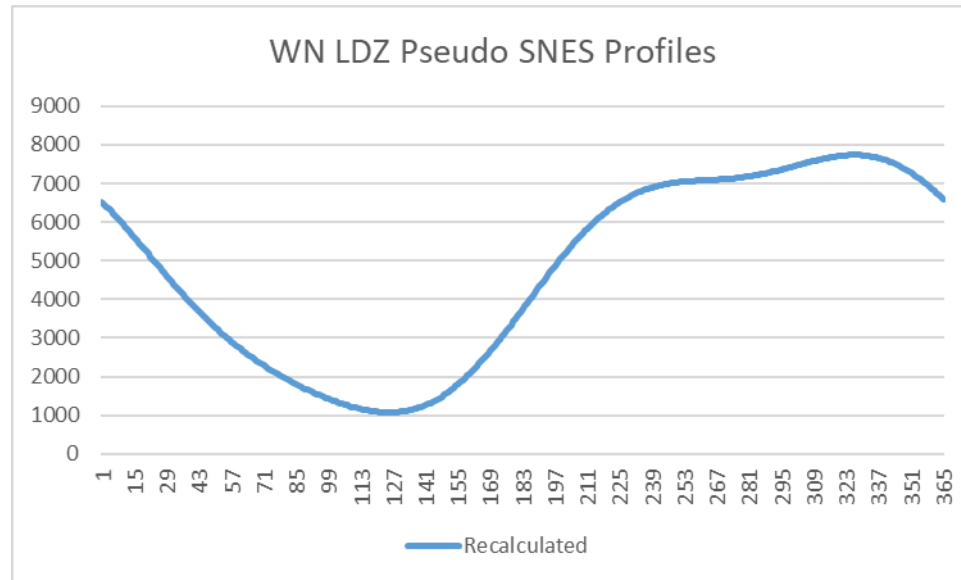
	2010	2011	2012	2013	2014	2015	2016	2017	All Years
Jan	-0.22%	0.17%	0.41%	-0.11%	-0.28%	-0.26%	0.27%	0.31%	0.04%
Feb	0.87%	0.69%	0.48%	-1.03%	-0.56%	0.05%	-0.34%	0.18%	0.04%
Mar	-0.19%	0.60%	-0.26%	0.02%	-0.46%	-0.70%	-0.01%	-0.19%	-0.15%
Apr	-1.30%	-0.17%	0.93%	-0.54%	-1.16%	-0.59%	-0.34%	-1.48%	-0.58%
May	-0.90%	-0.47%	-0.81%	-1.83%	-0.47%	-1.20%	-2.06%	-2.82%	-1.32%
Jun	-2.25%	-0.84%	2.19%	0.19%	-1.48%	1.36%	-2.58%	1.47%	-0.24%
Jul	0.49%	-2.31%	0.97%	0.51%	-1.33%	-1.29%	1.09%	-1.01%	-0.36%
Aug	-0.95%	-1.26%	3.51%	1.38%	-1.29%	0.24%	0.59%	0.28%	0.31%
Sep	-0.77%	-2.16%	-2.86%	-4.07%	-5.14%	-0.92%	-1.07%	-3.65%	-2.58%
Oct	-1.53%	-1.59%	3.19%	1.15%	-0.36%	-2.07%	-1.93%	0.30%	-0.36%
Nov	-0.46%	-0.58%	0.35%	-0.51%	-0.46%	-0.82%	-1.11%	-1.82%	-0.68%
Dec	0.54%	0.65%	-0.93%	0.15%	-0.17%	0.97%	0.26%	0.01%	0.19%
All Months	-0.56%	-0.60%	0.60%	-0.39%	-1.10%	-0.44%	-0.60%	-0.70%	-0.47%

2020

Fixed Wind Speed



SNES



Results: LDZ WS

Parameter	2015	2020
Effective Temperature/AT Weight	0.5	0.5431
Effective Temperature Weight (I1)	0.669	0.657
Wind Chill Weight (I2)	0.010	0.008
Cold Weather Sensitivity (I3)	0.110	0.079
Cold Weather Upturn Threshold (V0)	3.000	1.797
Lower Warm Weather Cut-Off (V1)	14.800	13.826
Upper Warm Weather Cut-Off (V2)	17.900	17.186
Slope Relating to Warm Weather Cut-Off (q)	0.460	0.384
Wind Chill Wind Cut-Off (W0)	0.000	-1.910
Wind Chill Temperature Cut-Off (T0)	14.000	17.068
Solar Radiance Effect (S0)		0.776
R2	0.9833	0.9862

2020 CWV+

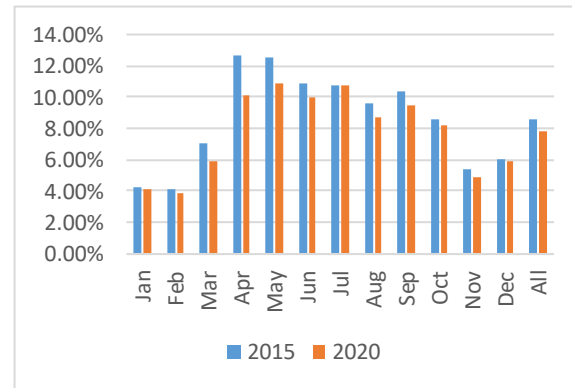
LDZ	Station
WS	St Athan

Gas Years	2010/11 to 2017/18
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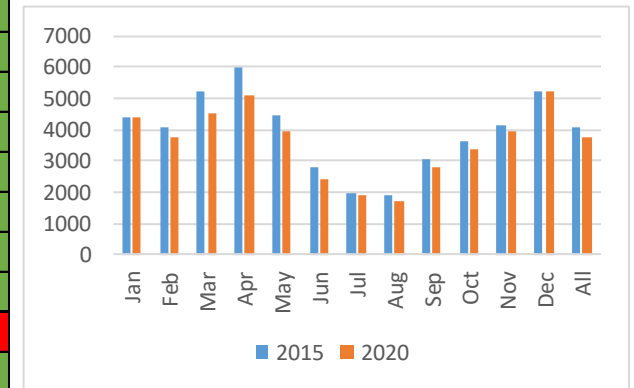
Parameters	Avg. Mean Abs. %Error
2015	8.56%
2020	7.77%

Avg. Adj. R-Sq.	Avg. RMSE (MWhs)	Avg. %diff. in est 1 in20 peak demand
0.9833	4097	
0.9862	3759	

MAPE							
Month	2015	2020	Season				
			Year	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
Jan	4.27%	4.12%	2015	4.84%	10.74%	10.43%	8.15%
Feb	4.10%	3.92%	2020	4.69%	8.99%	9.80%	7.53%
Mar	7.11%	5.97%					
Apr	12.67%	10.12%					
May	12.50%	10.92%					
Jun	10.95%	9.95%					
Jul	10.77%	10.78%					
Aug	9.58%	8.67%					
Sep	10.39%	9.46%					
Oct	8.61%	8.17%					
Nov	5.42%	4.92%					
Dec	6.06%	5.97%					
All	8.56%	7.77%					



RMSE							
Month	2015	2020	Season				
			Year	Dec - Feb	Mar - May	Jun-Aug	Sep- Nov
Jan	4385	4360	2015	4681	5270	2252	3473
Feb	4050	3724	2020	4565	4557	2019	3400
Mar	5240	4546					
Apr	6005	5118					
May	4482	3953					
Jun	2816	2416					
Jul	1962	1898					
Aug	1880	1689					
Sep	3059	2799					
Oct	3628	3347					
Nov	4156	3957					
Dec	5210	5213					
All	4097	3759					



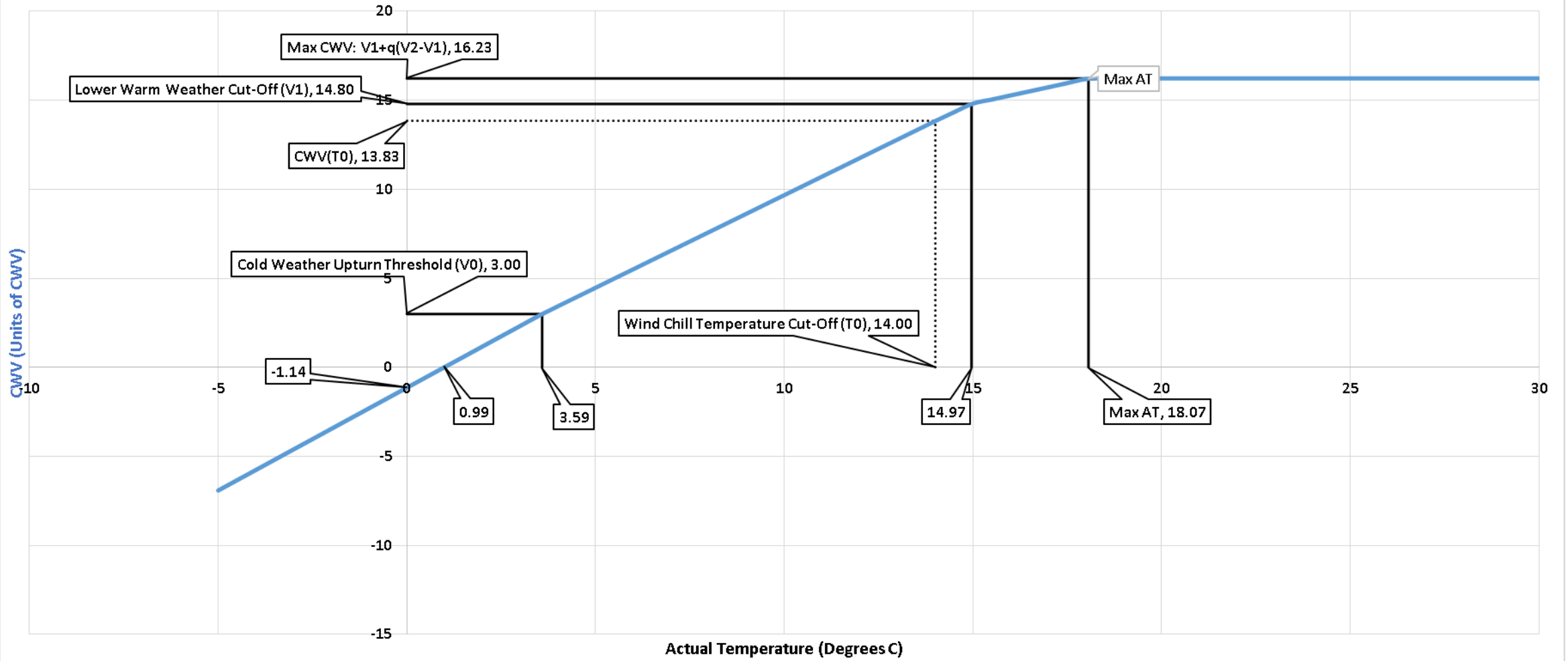
2020 CWV+ variance v CWV benchmark

	2010	2011	2012	2013	2014	2015	2016	2017	All Years
Jan	0.21%	-0.54%	-1.02%	0.34%	-0.10%	-0.35%	-0.16%	0.35%	-0.16%
Feb	-0.89%	-0.41%	-0.57%	-0.56%	-0.23%	1.01%	0.01%	0.19%	-0.18%
Mar	-1.83%	-3.63%	-0.74%	-0.79%	-0.86%	-0.45%	-0.48%	-0.37%	-1.14%
Apr	-6.16%	-2.02%	-0.44%	-1.36%	-4.97%	-0.83%	-3.34%	-1.21%	-2.54%
May	0.23%	-1.73%	-1.94%	-2.42%	0.09%	-1.90%	-1.76%	-3.25%	-1.58%
Jun	-1.17%	-3.45%	-1.33%	-0.19%	-0.46%	0.17%	-1.90%	0.33%	-1.00%
Jul	0.53%	-0.93%	-1.68%	1.88%	-2.06%	-0.85%	2.23%	1.03%	0.02%
Aug	0.14%	-0.85%	-0.79%	-1.05%	-2.59%	-2.00%	-0.16%	-0.05%	-0.92%
Sep	-1.00%	-0.65%	-1.93%	-0.51%	-1.48%	-1.44%	0.87%	-1.30%	-0.93%
Oct	-0.32%	-1.59%	-0.92%	1.12%	0.61%	-1.78%	-1.48%	0.86%	-0.44%
Nov	-0.76%	-1.01%	-0.36%	-0.03%	-0.32%	-1.17%	-0.30%	-0.04%	-0.50%
Dec	0.17%	0.27%	0.27%	-0.89%	-0.14%	-0.07%	-0.57%	0.23%	-0.09%
All Months	-0.90%	-1.38%	-0.96%	-0.37%	-1.04%	-0.81%	-0.59%	-0.27%	-0.79%

2015

Fixed Wind Speed

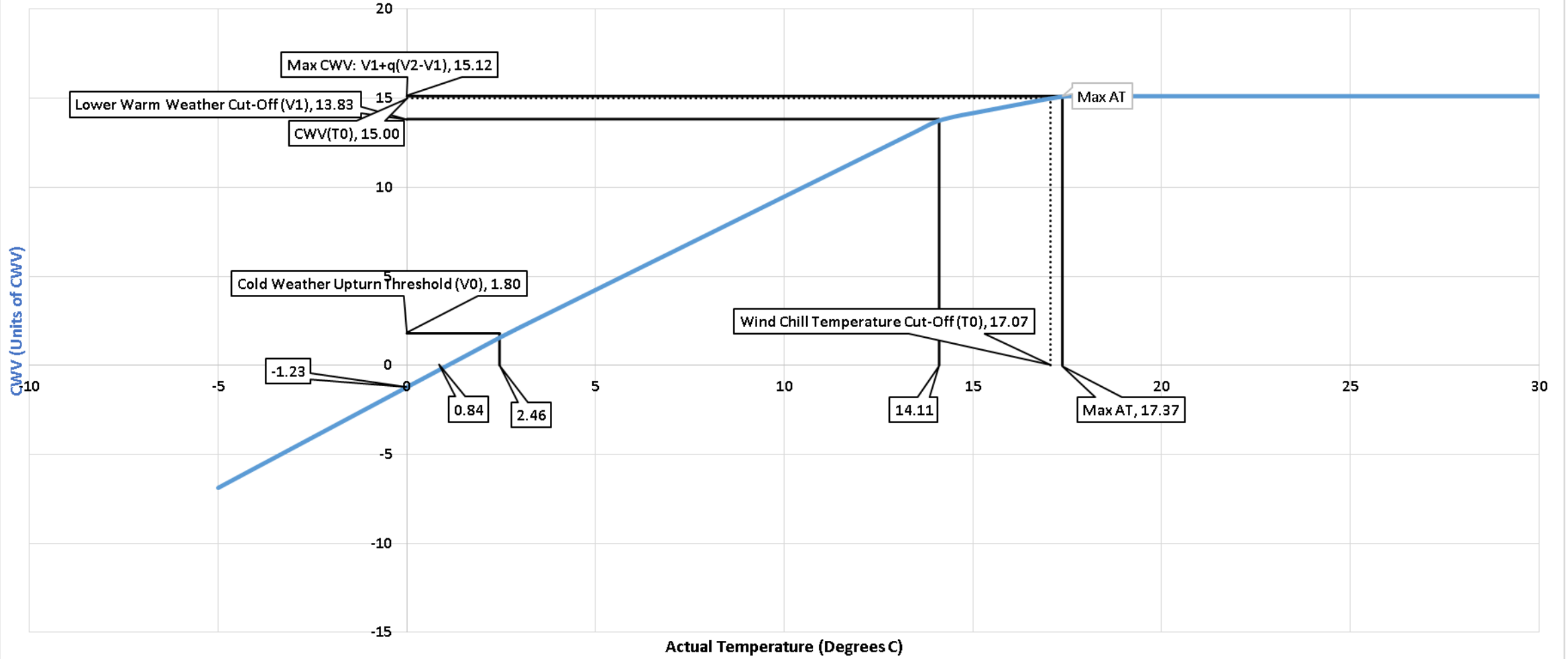
4.00



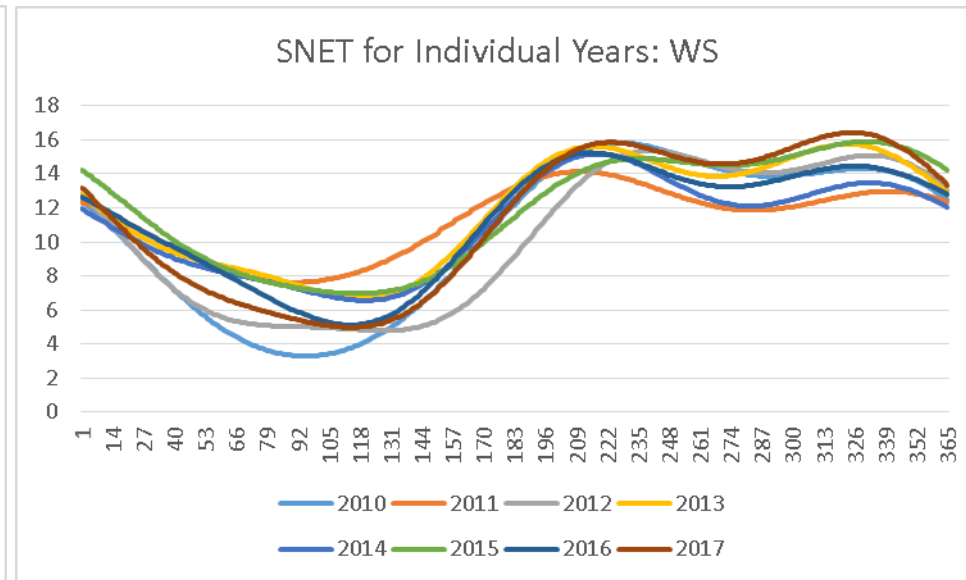
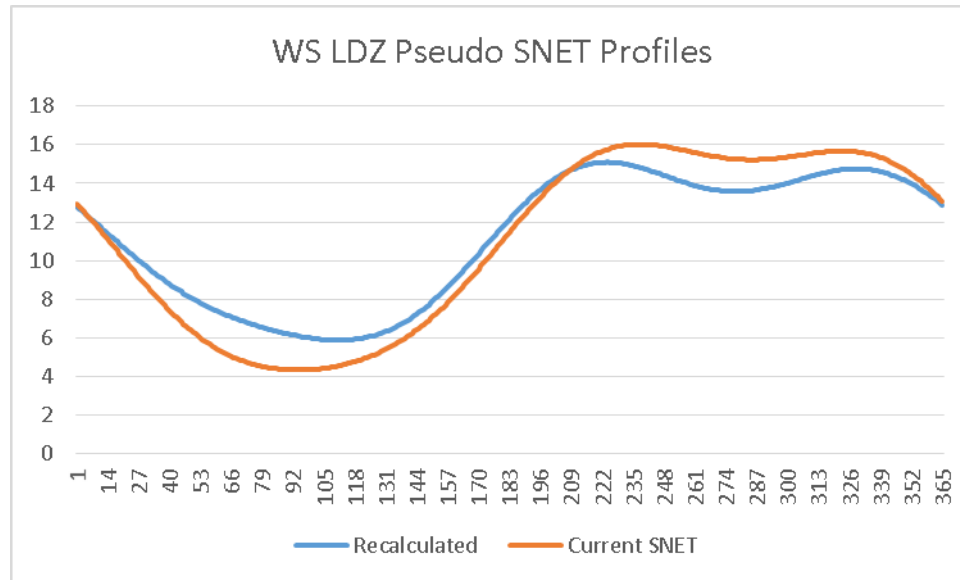
2020

Fixed Wind Speed

4.00



SNET



SNES

